

Combinations of Standard Products and Made

Series MB

●: Standard
⊙: Made to Order specifications
○: Special product (Contact SMC for details.)
—: Not available

Symbol	Specification	Applicable bore size	Series MB (Standard)					
			Action/Type					
			Double acting				Cushion	
			Single rod		Double rod		Air	
		Rubber		Air				
		ø32 to ø100	ø125	ø32 to ø100	ø125	ø32 to ø100	ø125	
Standard	Standard	ø32 to ø125	●	●	●	●	●	●
Long st	Long stroke		●	●	●	●	●	○
D	Built-in magnet		●	●	●	●	●	●
MB□-□ ^J _K	With rod boot		●	●	●	●	●	●
10-	Clean series		●	○	●	○	●	○
20-	Copper and Fluorine-free		●	○	●	○	●	○
MB□ ^R _V	Water resistant		●	○	●	○	●	○
XA□	Change of rod end shape	ø32 to ø125	⊙	⊙	⊙	⊙	⊙	⊙
XB5	Oversized rod cylinder		⊙	○	○	○	○	○
XB6	Heat-resistant cylinder (-10 to 150°C)		⊙	○	○	○	⊙	○
XB13	Low-speed cylinder (5 to 50 mm/s)		⊙	○	⊙	○	○	○
XC3	Special port position		⊙	○	⊙	○	⊙	○
XC4	With heavy duty scraper		⊙	○	⊙	○	⊙	○
XC5	Heat-resistant cylinder (-10 to 110°C)		⊙	○	○	○	⊙	○
XC6	Made of stainless steel		⊙	⊙	⊙	⊙	⊙	○
XC7	Tie-rod, cushion valve, tie-rod nut, etc. made of stainless steel		⊙	○	⊙	○	⊙	○
XC8	Adjustable stroke cylinder/Adjustable extension type		⊙	○	⊙	○	—	—
XC9	Adjustable stroke cylinder/Adjustable retraction type		⊙	○	⊙	○	—	—
XC10	Dual stroke cylinder/Double rod type		⊙	○	⊙	○	—	—
XC11	Dual stroke cylinder/Single rod type		⊙	○	⊙	○	—	—
XC12	Tandem cylinder		⊙	○	⊙	○	○	○
XC14	Change of trunnion bracket mounting position		⊙	⊙	⊙	⊙	⊙	⊙
XC22	Fluororubber seal		⊙	○	⊙	○	⊙	○
XC27	Double clevis pins made of stainless steel (Stainless steel 304)		⊙	⊙	⊙	⊙	—	—
XC29	Double knuckle joint with spring pin		⊙	○	⊙	○	○	○
XC30	Rod side trunnion		⊙	○	⊙	○	⊙	○
XC35	With coil scraper		⊙	○	⊙	○	⊙	○
XC59	Fluororubber seal, Built-in hard plastic magnet		⊙	○	⊙	○	○	○
XC65	XC6 + XC7 specifications		⊙	○	⊙	○	○	○
X1184	Cylinder with reed, heat-resistant switch		⊙	○	○	○	○	○

Note 1) Simple specials except XC14A and XC14B.

Note 2) XC10 specification for Series MBK is the non-rotating type on both sides. When the non-rotating type is applicable on one side, submit a special order request form.

to Order Specifications

Series **MB**

MB (Standard)		MBK (Non-rotating)				MB□Q (Low friction)		MBB (End lock)
Double acting								
Double rod		Single rod		Double rod		Single rod	Single rod	
Rubber		Air	Rubber	Air	Rubber	—	Air	
ø32 to ø100	ø125	ø32 to ø100						
●	●	●	●	●	●	●	●	
●	○	●	●	●	●	○	○	
●	●	●	●	●	●	●	●	
●	●	●	●	●	●	○	●	
●	○	○	○	○	○	○	○	
●	○	—	—	—	—	—	○	
●	○	—	—	—	—	○	○	
◎	◎	◎	◎	○	○	◎	◎	
○	○	○	○	○	○	○	○	
○	○	○	○	○	○	—	○	
○	○	○	○	○	○	—	○	
◎	○	◎	◎	◎	◎	◎	○	
◎	○	—	—	—	—	—	○	
○	○	○	○	○	○	—	○	
◎	○	◎	◎	◎	◎	◎	○	
◎	○	◎	◎	◎	◎	◎	◎	
—	—	◎	◎	—	—	○	○	
—	—	◎	◎	—	—	○	○	
—	—	◎(Note 2)	◎(Note 2)	—	—	○	◎	
—	—	○	○	—	—	○	○	
○	○	○	○	○	○	○	○	
◎	◎	◎	◎	○	○	◎	◎(Note 1)	
◎	○	○	○	○	○	—	○	
—	—	◎	◎	○	○	◎	◎	
○	○	○	○	○	○	◎	◎	
◎	○	◎	◎	◎	◎	◎	◎	
◎	○	—	—	—	—	○	○	
○	○	○	○	○	○	○	○	
○	○	○	○	○	○	○	○	
○	○	—	—	—	—	—	○	

- CJ1**
- CJP**
- CJ2**
- CM2**
- CG1**
- MB**
- MB1**
- CA2**
- CS1**
- CS2**

- D-□**
- X□**
- Individual
-X□
- Technical
data

Double acting,
Single rod

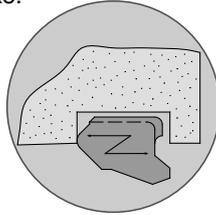
Double acting,
Double rod

Double acting,
Non-rotating rod

Series MB, MBW, MBK,

Improved cushion capacity

"Floating" cushion seal design eliminates piston rod "bouncing" due to cracking pressure at beginning of stroke.



Increased kinetic energy absorption

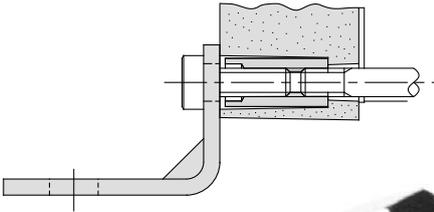
Elevated cushion volume and the adoption of a new cushion seal design permit about 30% more allowable kinetic energy over the CA1 series. In addition, service life of cushion seal is about 5 times greater.

Compact and lightweight design

The square cover is made more compact than the CA1 series. In addition, die cast covers yield 10 to 25% weight reduction over the CA1 series.

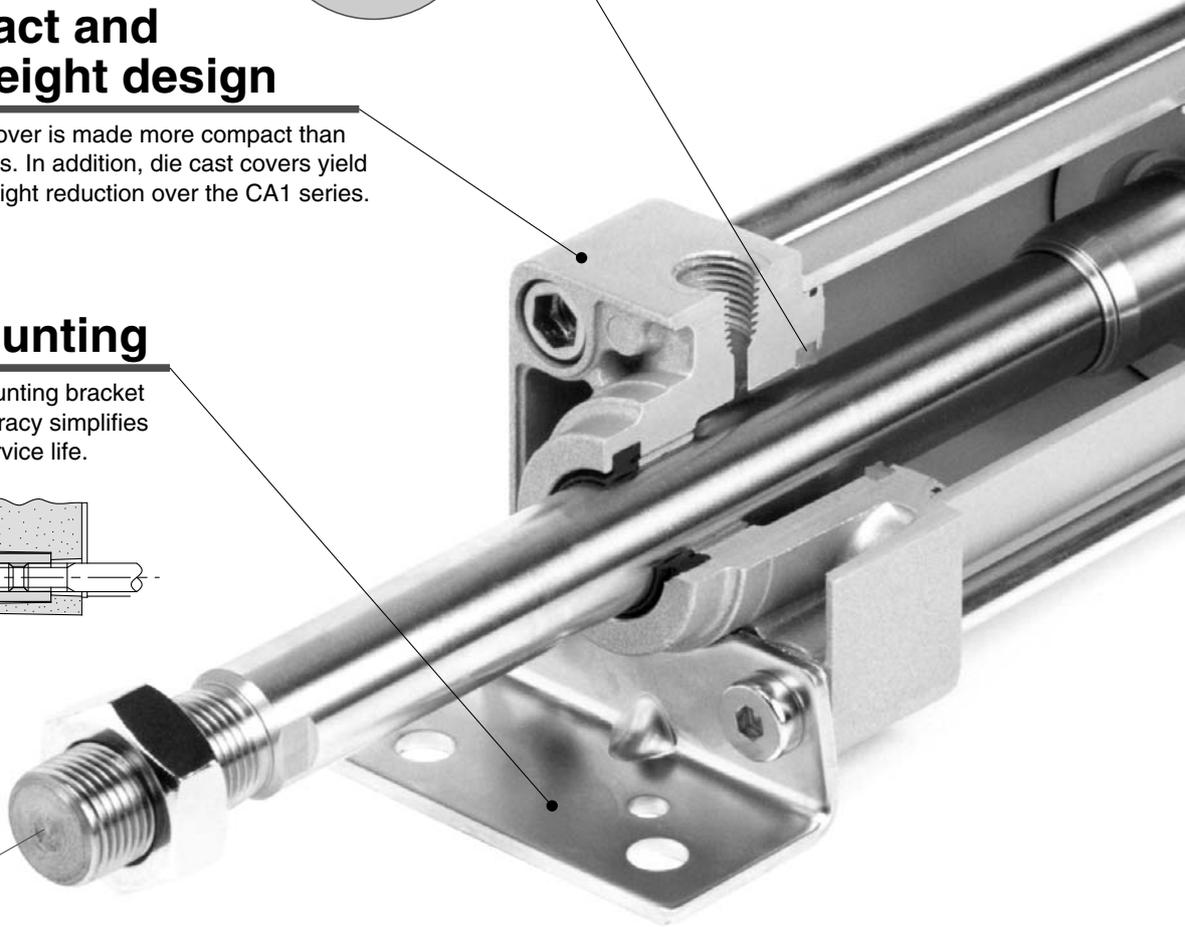
Accurate mounting

The cylinder cover and mounting bracket with high dimensional accuracy simplifies installation and extends service life.



Minimal rod deflection

Improved bushing and piston rod dimensional accuracy achieves tighter clearances and reduced piston rod deflection.



Low friction

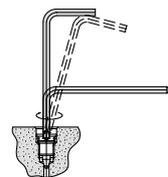
End lock type

MB□Q, MBB

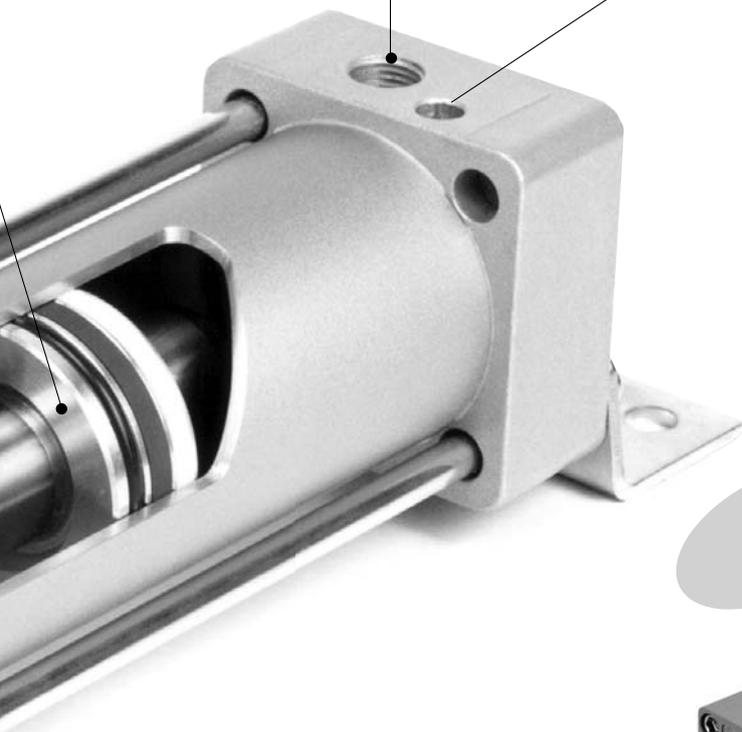
ø32, ø40, ø50, ø63, ø80, ø100, ø125

Easy adjustment of cushion valve

Adjustment of the cushion valve is made with a hex. wrench allowing for easy fine adjustment. The cushion valve is recessed in the cover.



Port



CJ1

CJP

CJ2

CM2

CG1

MB

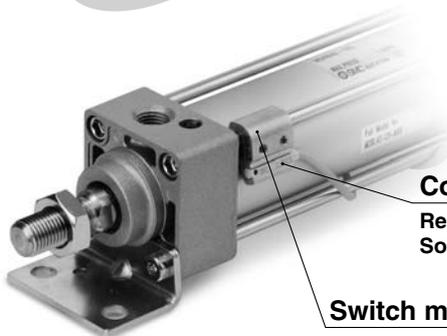
MB1

CA2

CS1

CS2

Compact type auto switches can be fitted.



Compact type auto switch

Reed auto switch: D-A9□

Solid state auto switch: D-M9□

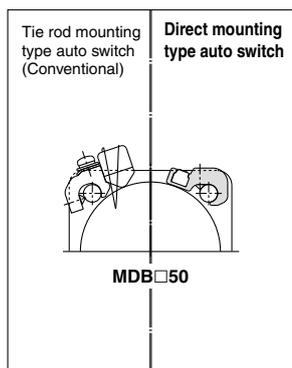
D-M9□W

Switch mounting bracket

A direct mounting type auto switch is secured on the tie rod with a dedicated switch bracket.

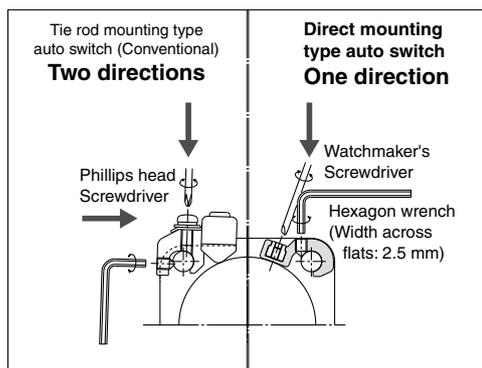
Miniaturization

Reduces the amount the auto switch protrudes from the cylinder.



Improved operability

Auto switch mounting and adjustment of the mounting position can be made via the same direction.



Auto switch

inventory control can be simplified.

Auto switch inventory control in the field can be simplified because direct mounting type auto switches are applicable to a wide variety of cylinders.

D-□

-X□

Individual

-X□

Technical data

Air Cylinder: Single Rod

Series MB

ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order

MB L 32 - 50 -

With auto switch **MDB L 32 - 50 - M9BW**

With auto switch (Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)

Refer to page 291 for standard strokes.

Auto switch

Nil	Without auto switch
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* For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
3	3
n	n

Rod boot/Cushion

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	Both ends
	N*	None

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Made to Order
For details, refer to page 291.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch. (Example) MDBB40-100

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load					
					DC	AC	Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)							
Solid state switch	—	Grommet	—	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC			
				3-wire (PNP)				M9P	—	●	●	●	○	○					
		2-wire		—	—	100 V, 200 V	M9B	—	●	●	●	○	○						
		—		—	—	J51	—	●	—	●	○	—							
	Terminal conduit	3-wire (NPN)	24 V	5 V, 12 V	—	—	—	G39	—	—	—	—	—	—	—				
		2-wire						K39	—	—	—	—	—						
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	—	●	●	●	○	○	IC circuit				
				3-wire (PNP)				M9PW	—	●	●	●	○	○					
	Water resistant (2-color indication)	Grommet	—	2-wire	24 V	12 V	—	M9BW	—	●	●	●	○	○	—				
				3-wire (NPN)				M9NA	—	○	○	●	○	○					
Diagnostic output (2-color indication)	Grommet	—	3-wire (PNP)	24 V	12 V	—	M9PA	—	○	○	●	○	○	IC circuit					
			2-wire				M9BA	—	○	○	●	○	○						
Magnetic field resistant (2-color indication)	Grommet	—	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	—	●	—	●	○	○	IC circuit					
			2-wire (Non-polar)				P4DW	—	—	—	●	●	○		○				
Reed switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	24 V	5 V	—	A96	—	●	—	●	—	—	IC circuit				
				No				2-wire	24 V	12 V	100 V	A93	—	●		—	●	—	IC circuit
				Yes							100 V or less	A90	—	●		—	●	—	
				No							100 V, 200 V	A54	—	●		—	●	●	
		Terminal conduit	Yes	2-wire	24 V	12 V	—	—	A64	—	●	—	●	—	—				
									—	A33	—	—	—	—		—			
		DIN terminal	Yes	2-wire	24 V	12 V	—	—	A34	—	—	—	—	—	—				
									—	A44	—	—	—	—		—			
Diagnostic indication (2-color indication)	Grommet	—	—	24 V	—	—	A59W	—	●	—	●	—	—	IC circuit					

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
 1 m M (Example) M9NWM
 3 m L (Example) M9NWL
 5 m Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

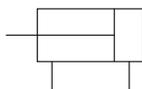
* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 327.

* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1328 and 1329 for details.

* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled when being shipped.)



JIS Symbol
Double acting



Made to Order Specifications
(For details, refer to pages 1373 to 1498 and 1515.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB5	Oversized rod cylinder
-XB6	Heat resistant cylinder (150°C)
-XB13	Low speed cylinder (5 to 50 mm/s)
-XC3	Special port position
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extend stroke
-XC9	Adjustable stroke cylinder/Adjustable retract stroke
-XC10	Dual stroke cylinder/Double rod
-XC11	Dual stroke cylinder/Single rod
-XC12	Tandem cylinder
-XC14	Change of trunnion bracket mounting position
-XC22	Fluororubber seals
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion
-XC35	With coil scraper
-XC59	Fluororubber seal, Built-in hard plastic magnet
-XC65	XC6 + XC7 specifications
-X1184	Cylinder with reed, heat-resistant switch

Refer to pages 322 and 327 for cylinders with auto switches.

- Minimum stroke for auto switch mounting
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Max. operating pressure	1.0 MPa						
Min. operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Operating piston speed	50 to 1000 mm/s 50 to 700 mm/s						
Allowable stroke tolerance	up to 250: $^{+1.0}_0$, 251 to 1000: $^{+1.4}_0$, 1001 to 1500: $^{+1.8}_0$						
Cushion <small>Note 1)</small>	Both ends (Air cushion)						
Port size (Rc, NPT, G)	1/8	1/4	3/8		1/2		
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion						

Note 1) When requesting a cylinder without air cushion, cylinder utilizes rubber bumpers which increases cylinders overall length.

Standard Stroke

Bore (mm)	Standard stroke (mm)	Max. stroke
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000	1400

Intermediate strokes are available. (No spacer is used.)

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot itself.

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot <small>Note 1)</small>	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10	MB-C12
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10	MB-D12

Note 1) Two foot brackets required for one cylinder.

Note 2) Accessories for each mounting bracket are as follows:

Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 298 for details.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

Technical
data

Series MB

Theoretical Force

(Unit: N) 

Bore size (mm)	Rod diameter (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)										
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
32	12	OUT	804	161	241	322	402	482	563	643	724	804		
		IN	691	138	207	276	346	415	484	553	622	691		
40	16	OUT	1257	251	377	503	629	754	880	1006	1131	1257		
		IN	1056	211	317	422	528	634	739	845	950	1056		
50	20	OUT	1963	393	589	785	982	1178	1374	1570	1767	1963		
		IN	1649	330	495	660	825	989	1154	1319	1484	1649		
63	20	OUT	3117	623	935	1247	1559	1870	2182	2494	2805	3117		
		IN	2803	561	841	1121	1402	1682	1962	2242	2523	2803		
80	25	OUT	5027	1005	1508	2011	2514	3016	3519	4022	4524	5027		
		IN	4536	907	1361	1814	2268	2722	3175	3629	4082	4536		
100	30	OUT	7854	1571	2356	3142	3927	4712	5498	6283	7069	7854		
		IN	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147		
125	32	OUT	12272	2454	3682	4909	6136	7363	8590	9818	11045	12272		
		IN	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468		

Note) Theoretical force (N) = Pressure (MPa) x Piston area (mm²)

Mass/Aluminum Tube

(kg)

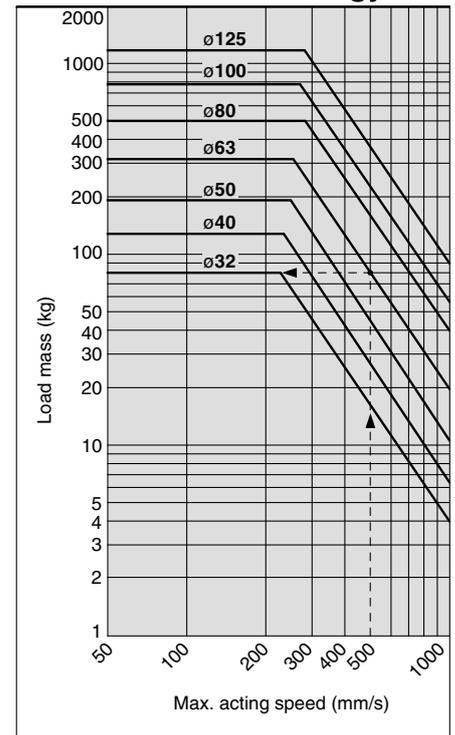
Bore size (mm)		32	40	50	63	80	100	125
Basic mass	Basic	0.50	0.69	1.19	1.47	2.73	3.70	5.48
	Foot	0.62	0.83	1.41	1.75	3.23	4.36	7.56
	Flange	0.79	1.06	1.64	2.26	4.18	7.01	9.64
	Single clevis	0.75	0.92	1.53	2.10	3.84	6.87	8.05
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39	8.25
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37	8.46
Additional mass per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56	0.71
Accessory	Single knuckle joint	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle joint (with pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation example: **MBB32-100** (Basic, ø32, 100 st)

- Basic mass 0.50 (Basic, ø32)
- Additional mass 0.11/50 stroke
- Cylinder stroke 100 stroke

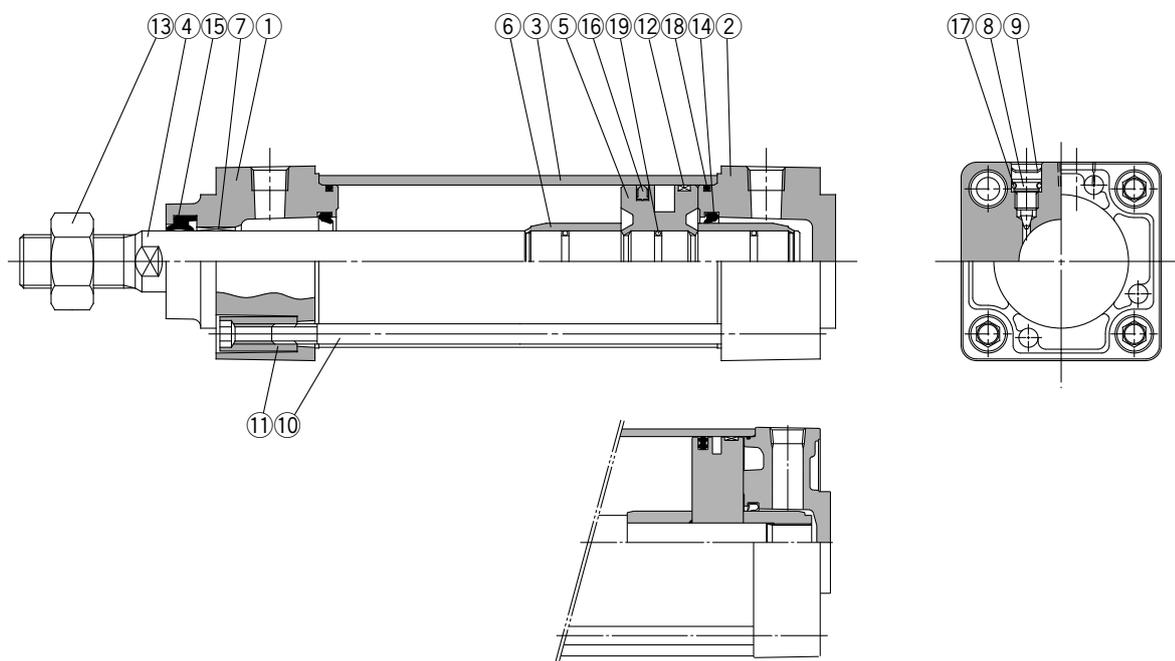
$$0.50 + 0.11 \times 100/50 = 0.72 \text{ kg}$$

Allowable Kinetic Energy



Example: Load limit at rod end when air cylinder ø63 is actuated with max. actuating speed 500 mm/s. See the intersection of lateral axis 500 mm/s and ø63 line, and extend the intersection to left. Thus the allowable load is 80 kg.

Construction



MB125

CJ1
CJP
CJ2
CM2
CG1
MB
MB1
CA2
CS1
CS2

Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum die-cast	Metallic painted
②	Head cover	Aluminum die-cast	Metallic painted
③	Cylinder tube	Aluminum alloy	Hard anodized
④	Piston rod	Carbon steel	Hard chrome plated
⑤	Piston	Aluminum alloy	Chromated
⑥	Cushion ring	Brass	
⑦	Bushing	Lead bronze cast	
⑧	Cushion ring	Steel wire	Nickel plated
⑨	Retaining ring	Steel for spring	ø40 to ø100
⑩	Tie rod	Carbon steel	Zinc chromated
⑪	Tie rod nut	Carbon steel	Nickel plated
⑫	Wear ring	Resin	
⑬	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
⑭*	Cushion seal	Urethane	
⑮*	Rod seal	NBR	
⑯*	Piston seal	NBR	
⑰	Cushion valve seal	NBR	
⑱*	Cylinder tube gasket	NBR	
⑲	Piston gasket	NBR	

Copper/Fluorine-free

20 - MB Mounting bracket Bore size Port thread type — Stroke Suffix

↓ **Copper/Fluorine-free**

Copper material has been replaced with non-copper material to prevent generation of copper ions. This is to eliminate influence of copper ions and fluororesin upon color CRT.

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MB32-PS	Set of the No. ⑭, ⑮, ⑯ and ⑱
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	
125	MB125-PS	

- * Seal kits consist of items ⑭, ⑮, ⑯ and ⑱, and can be ordered by using the seal kit number corresponding to each bore size.
- * Trunnion type should not be disassembled. (Refer to page 328.)
- * Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
- Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Water Resistant Air Cylinder

Water resistant air cylinders are also available in Series MB, which are suitable for use on machine tools, where exposure to coolant is possible and applicable for food machinery and automobile washing equipment in an environment where water splashes. Please refer to page 899 for more information.

Specifications

Action	Double acting single rod
Bore size	ø32, ø40, ø50, ø63, ø80, ø100
Max. operating pressure	1.0 MPa
Min. operating pressure	0.05 MPa
Cushion	Air cushion *
Piping	Screw-in piping
Operating piston speed	50 to 1000 mm/s
Mounting bracket	Basic, Axial foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion

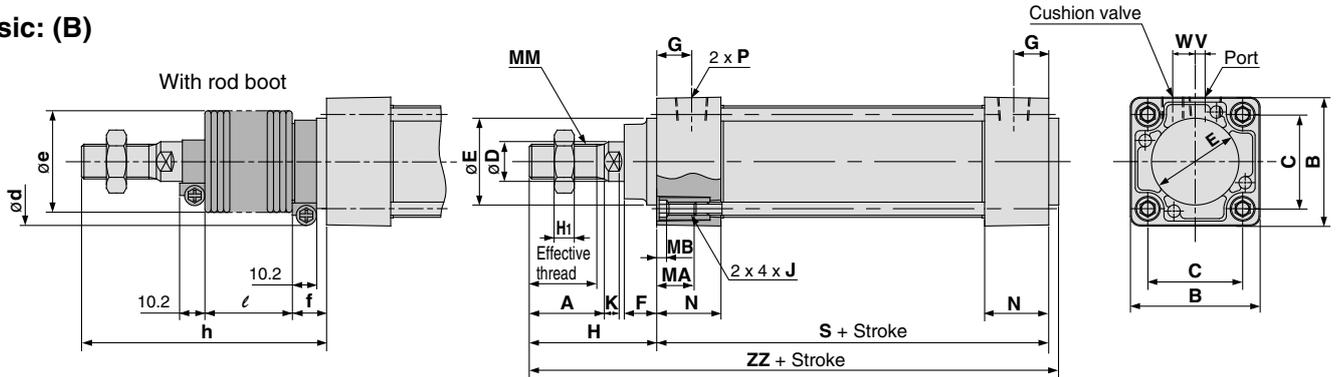
- * Auto switch capable.
- ★ The cylinder should be operated within its allowable kinetic energy. (Refer to page 292.)
- * In case of types with no air cushion, a rubber bumper is used.

D -□
-X □
Individual -X □
Technical data

Series MB

Without Mounting Bracket

Basic: (B)



Bore size (mm)	Stroke range (mm)	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H1	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*
32	to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	135
40	to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	9	139
50	to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	156
80	to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	190
100	to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	190
125	to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2	38	1/2	120	17	15	223

With Rod Boot

Bore size (mm)	d	e	f	ℓ																			
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000								
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	—	—	—	—	—	—	—	—
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	—	—	—	—	—	—	—	—
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	—	—	—	—	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	—	—	—	—	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	—	—	—	—	—	—	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	—	—	—	—	—	—	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	—	—	—	—	—	—	—	—

Bore size (mm)	h											
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	73	86	98	111	136	161	186	—	—	—	—	—
40	81	94	106	119	144	169	194	—	—	—	—	—
50	89	102	114	127	152	177	202	227	—	—	—	—
63	89	102	114	127	152	177	202	227	—	—	—	—
80	101	114	126	139	164	189	214	239	264	289	—	—
100	101	114	126	139	164	189	214	239	264	289	—	—
125	120	130	140	150	170	190	210	230	250	270	290	310

Without Air Cushion

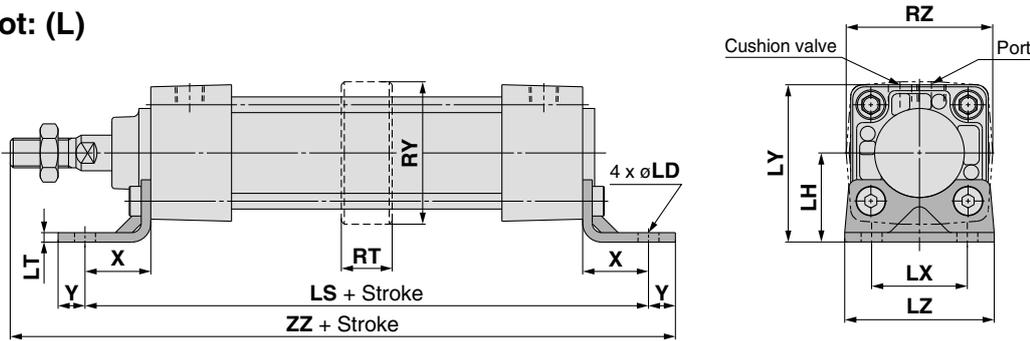
Bore size (mm)	S	ZZ
32	90	141
40	90	145
50	102	164
63	102	164
80	124	200
100	124	200
125	132	235

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

With Mounting Bracket

* Refer to Basic (B) for other dimensions and with rod boot.

Foot: (L)

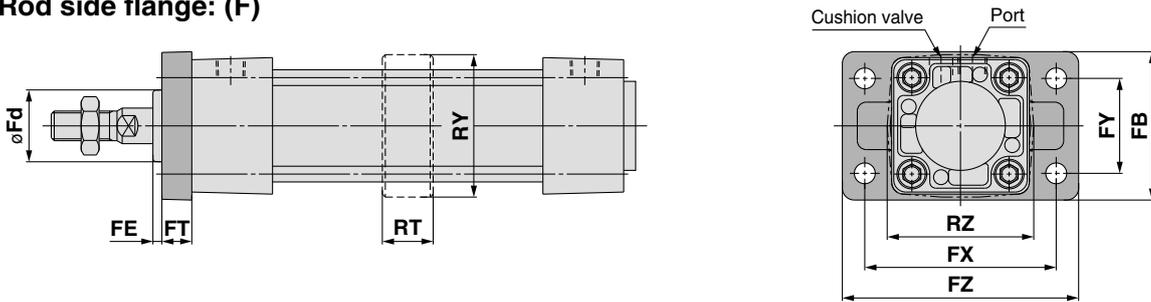


Foot													(mm)	
Bore size (mm)	Stroke range	X	Y	LD	LH	LS*	LT	LX	LY	LZ	RT	RY	RZ	ZZ*
32	to 700	22	9	7	30	128	3.2	32	53	50	—	—	—	162
40	to 800	24	11	9	33	132	3.2	38	59	55	—	—	—	170
50	to 1000	27	11	9	40	148	3.2	46	72.5	70	—	—	—	190
63	to 1000	27	14	12	45	148	3.6	56	82.5	80	—	—	—	193
80	to 1000	30	14	12	55	174	4.5	72	102.5	100	—	—	—	230
100	to 1000	32	16	14	65	178	4.5	89	122	120	—	—	—	234
125	to 1400	45	20	14	81	210	8	90	149	136	50	148	160	282

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

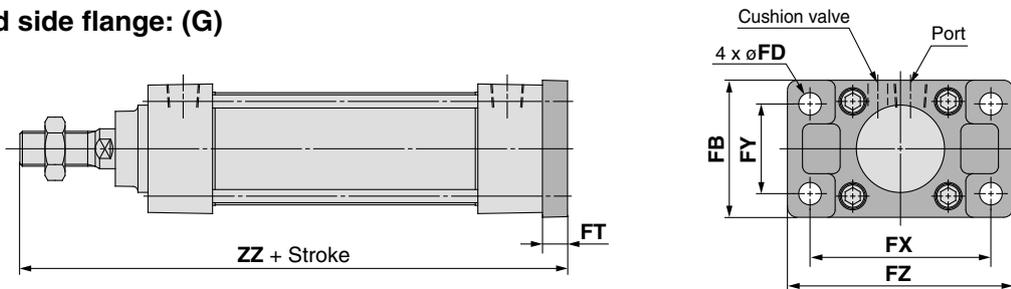
Without Air Cushion		
Bore size (mm)	LS	ZZ
32	134	168
40	138	176
50	156	198
63	156	201
80	184	240
100	188	244
125	222	294

Rod side flange: (F)



Rod Side Flange													Without Air Cushion	
Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd	RT	RY	RZ	Bore size (mm)	ZZ
32	to 700	50	7	3	10	64	32	79	25	—	—	—	32	147
40	to 800	55	9	3	10	72	36	90	31	—	—	—	40	151
50	to 1000	70	9	2	12	90	45	110	38.5	—	—	—	50, 63	172
63	to 1000	80	9	2	12	100	50	120	39.5	—	—	—	80, 100	212
80	to 1000	100	12	4	16	126	63	153	45	—	—	—	125	249
100	to 1000	120	14	4	16	150	75	178	54	—	—	—		
125	to 1400	138	14	7	20	180	102	216	57.5	50	148	160		

Head side flange: (G)



Head Side Flange										Without Air Cushion	
Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ*	Bore size (mm)	ZZ	
32	to 500	50	7	10	64	32	79	141	32	147	
40	to 500	55	9	10	72	36	90	145	40	151	
50	to 600	70	9	12	90	45	110	164	50, 63	172	
63	to 600	80	9	12	100	50	120	164	80, 100	212	
80	to 800	100	12	16	126	63	153	202	125	249	
100	to 800	120	14	16	150	75	178	202			
125	to 1000	138	14	20	180	102	216	237			

* Rod/Head side flange
 Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB**
- MB1
- CA2
- CS1
- CS2

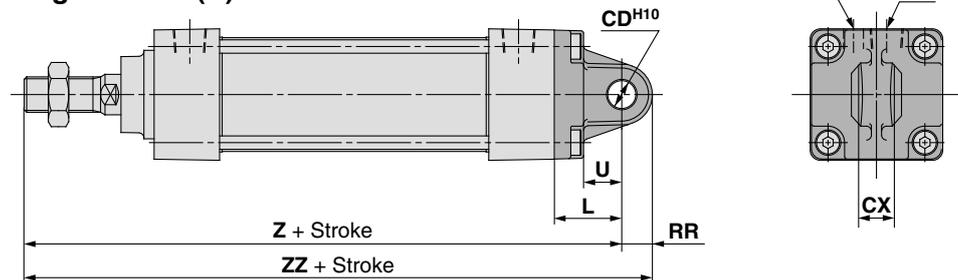
- D-□
- X□
- Individual -X□
- Technical data

Series MB

With Mounting Bracket

* Refer to Basic (B) for other dimensions and with rod boot.

Single clevis: (C)



*** Single clevis**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

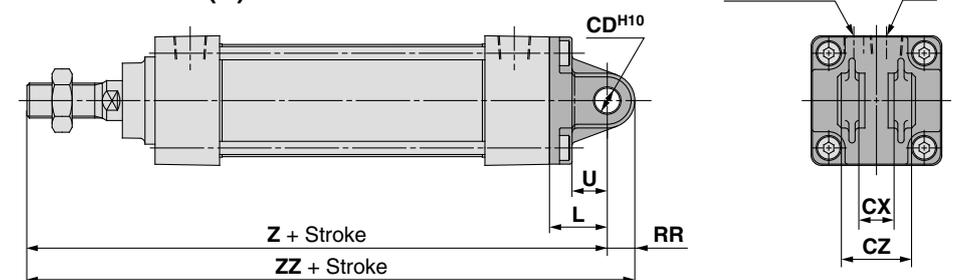
Single Clevis

Bore size (mm)	Stroke range	L	RR	U	CD ^{H10}	CX ^{-0.1} _{-0.3}	Z*	ZZ*
32	to 500	23	10.5	13	10	14	154	164.5
40	to 500	23	11	13	10	14	158	169
50	to 600	30	15	17	14	20	182	197
63	to 600	30	15	17	14	20	182	197
80	to 800	42	23	26	22	30	228	251
100	to 800	42	23	26	22	30	228	251
125	to 1000	50	28	30	25	32	267	295

Without Air Cushion

Bore size (mm)	z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Double clevis: (D)



*** Double clevis**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

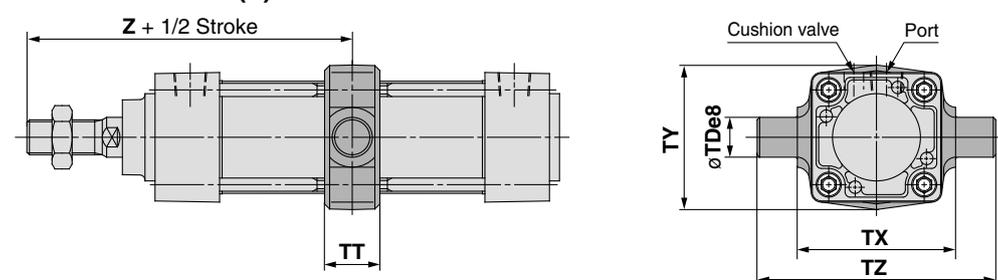
Double Clevis

Bore size (mm)	Stroke range	L	RR	U	CD ^{H10}	CX ^{+0.3} _{+0.1}	CZ	Z*	ZZ*
32	to 500	23	10.5	13	10	14	28	154	164.5
40	to 500	23	11	13	10	14	28	158	169
50	to 600	30	15	17	14	20	40	182	197
63	to 600	30	15	17	14	20	40	182	197
80	to 800	42	23	26	22	30	60	228	251
100	to 800	42	23	26	22	30	60	228	251
125	to 1000	50	28	30	25	32	64	267	295

Without Air Cushion

Bore size (mm)	z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Center trunnion: (T)



**** Center trunnion**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm

Center Trunnion

Bore size (mm)	Stroke range	TDe8	TT	TX	TY	TZ	Z**
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 800	20	34	110	110	150	129
100	to 800	25	40	132	136	182	129
125	to 1000	25	50	160	160	210	157

Without Air Cushion

Bore size (mm)	z
32	92
40	96
50, 63	109
80, 100	134
125	163

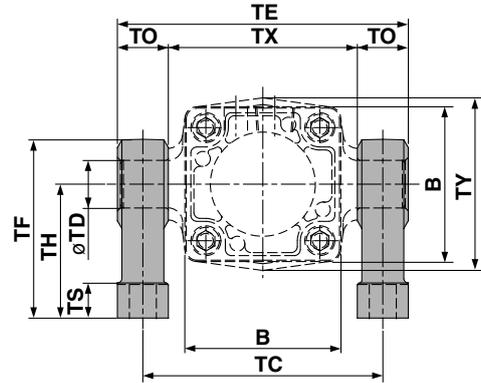
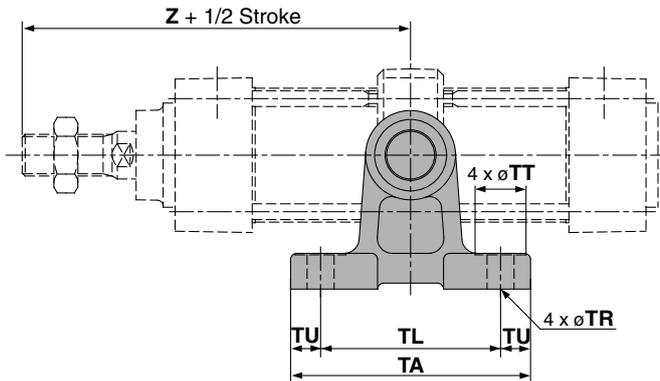
Trunnion/Double Clevis Pivot Bracket

Part No.

Cylinder model	MB□32	MB□40	MB□50	MB□63	MB□80	MB□100	MB□125
Description							
Trunnion pivot bracket <small>Note 1)</small>	MB-S03	MB-S04		MB-S06		MB-S10	MB-S12
Double clevis pivot bracket	MB-B03		MB-B05		MB-B08		MB-B12

Note 1) When ordering a trunnion pivot bracket, order 2 pcs. for 1 cylinder.

Trunnion pivot bracket



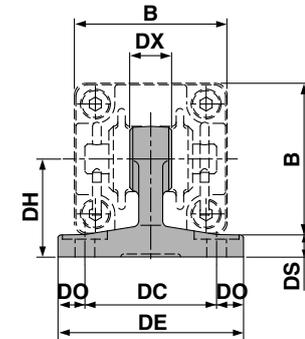
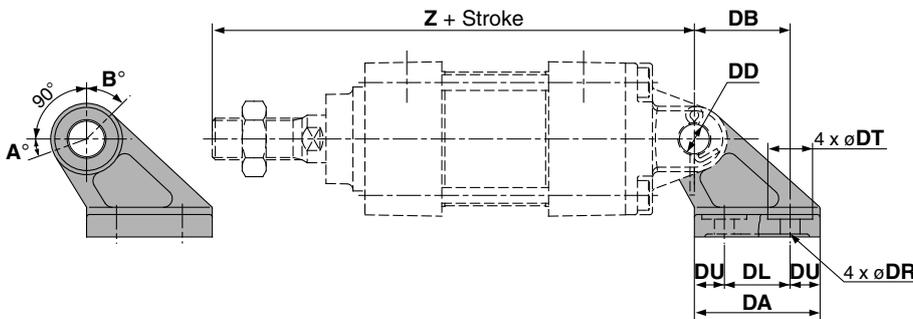
(mm)

Part no.	Bore size (mm)	B	TA	TL	TU	TC	TX	TE	TO	TR	TT	TS	TH	TF	Z**	TD _{H10}
MB-S03	32	46	62	45	8.5	62	50	74	12	7	13	10	35	47	89	12 ^{+0.070/0}
MB-S04	40	52	80	60	10	80	63	97	17	9	17	12	45	60	93	16 ^{+0.070/0}
	50	65	80	60	10	92	75	109	17	9	17	12	45	60	105	16 ^{+0.070/0}
MB-S06	63	75	100	70	15	110	90	130	20	11	22	14	60	80	105	20 ^{+0.084/0}
	80	95	100	70	15	130	110	150	20	11	22	14	60	80	129	20 ^{+0.084/0}
MB-S10	100	114	120	90	15	158	132	184	26	13.5	24	17	75	100	129	25 ^{+0.084/0}
MB-S12	125	136	142	105	18.5	186	160	212	26	13.5	24	25	85	115	157	25 ^{+0.084/0}

Without Air Cushion

Bore size (mm)	Z
32	92
40	96
50	109
63	109
80	134
100	134
125	163

Double clevis pivot bracket



(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z*	DD _{H10}
MB-B03	32	46	42	32	22	10	44	14	62	9	6.6	15	7	33	154	10 ^{+0.058/0}
	40	52	42	32	22	10	44	14	62	9	6.6	15	7	33	158	10 ^{+0.058/0}
MB-B05	50	65	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 ^{+0.070/0}
	63	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 ^{+0.070/0}
MB-B08	80	95	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 ^{+0.084/0}
	100	114	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 ^{+0.084/0}
MB-B12	125	136	90	78	60	15	110	32	136	13	13.5	24	14	75	267	25 ^{+0.084/0}

Without Air Cushion

Bore size (mm)	Z
32	160
40	164
50	190
63	190
80	238
100	238
125	279

Rotating Angle

Bore size (mm)	A°	B°	A° + B° + 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°
125	30°	50°	170°

** Trunnion pivot bracket

Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston; ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm

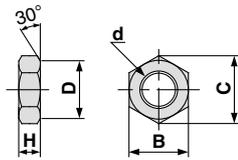
* Mounting plate

Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston; ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Series MB

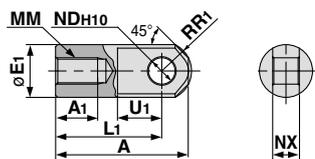
Dimensions for Accessories

Rod end nut
(Standard)



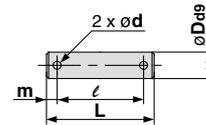
Part no.	Bore size (mm)	d	H	B	C	D
NT-03	32	M10 x 1.25	6	17	19.6	16.5
NT-04	40	M14 x 1.5	8	22	25.4	21
NT-05	50, 63	M18 x 1.5	11	27	31.2	26
NT-08	80	M22 x 1.5	13	32	37.0	31
NT-10	100	M26 x 1.5	16	41	47.3	39
NT-12M	125	M27 x 2	16	41	47.3	39

I type
Single knuckle joint



Part no.	Bore size (mm)	A	A ₁	E ₁	L ₁	MM	R ₁	U ₁	ND _{H10}	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	10 ^{+0.058} ₀	14 ^{-0.10} _{-0.30}
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	10 ^{+0.058} ₀	14 ^{-0.10} _{-0.30}
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	14 ^{+0.070} ₀	20 ^{-0.10} _{-0.30}
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	22 ^{+0.084} ₀	30 ^{-0.10} _{-0.30}
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	22 ^{+0.084} ₀	30 ^{-0.10} _{-0.30}
I-12M	125	119	36	46	92	M27 x 2.0	28.5	34	25 ^{+0.084} ₀	32 ^{-0.10} _{-0.30}

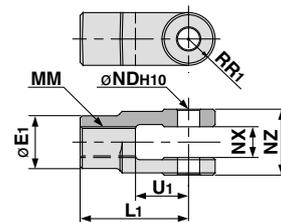
Knuckle joint pin
Clevis pin



Part no.	Bore size (mm)		D _{as}	L	l	m	d (Through hole diameter)	Applicable cotter pin
	Clevis	Knuckle						
CD-M03 ^{Note 1)}	32, 40	10 ^{-0.040} _{-0.076}	44	36	4	3	ø3 x 18 ℓ	
CD-M05 ^{Note 1)}	50, 63	14 ^{-0.050} _{-0.093}	60	51	4.5	4	ø4 x 25 ℓ	
CD-M08 ^{Note 1)}	80, 100	22 ^{-0.065} _{-0.117}	82	72	5	4	ø4 x 35 ℓ	
IY-12 ^{Note 2)}	125	25 ^{-0.065} _{-0.117}	79.5	69.5	5	4	ø4 x 40 ℓ	

Note 1) A cotter pin and a flat washer are equipped as standard. Note 2) Only pins are included when shipped.

Y type
Double knuckle joint



Part no.	Bore size (mm)	E ₁	L ₁	MM	R ₁	U ₁	ND _{H10}	NX	NZ
Y-03M ^{Note 1)}	32	20	30	M10 x 1.25	10	16	10 ^{+0.058} ₀	14 ^{+0.30} _{+0.10}	28 ^{-0.10} _{-0.30}
Y-04M ^{Note 1)}	40	22	40	M14 x 1.5	11	19	10 ^{+0.058} ₀	14 ^{+0.30} _{+0.10}	28 ^{-0.10} _{-0.30}
Y-05M ^{Note 1)}	50, 63	28	50	M18 x 1.5	14	24	14 ^{+0.070} ₀	20 ^{+0.30} _{+0.10}	40 ^{-0.10} _{-0.30}
Y-08M ^{Note 1)}	80	40	65	M22 x 1.5	20	34	22 ^{+0.084} ₀	30 ^{+0.30} _{+0.10}	60 ^{-0.10} _{-0.30}
Y-10M ^{Note 1)}	100	40	65	M26 x 1.5	20	34	22 ^{+0.084} ₀	30 ^{+0.30} _{+0.10}	60 ^{-0.10} _{-0.30}
Y-12M ^{Note 2)}	125	46	100	M27 x 2	27	42	25 ^{+0.084} ₀	32 ^{+0.30} _{+0.10}	64 ^{-0.10} _{-0.30}

Note 1) A pin, cotter pin and a flat washer are equipped as standard. Note 2) A pin and a cotter pin are equipped as standard.

Combinations of Support Brackets

Available Combination..... Refer to below picture together.

Bracket for work Bracket for cylinder	Single clevis	Double clevis	Single knuckle joint	Double knuckle joint	Pivot bracket
Single clevis	—	①	—	②	—
Double clevis	③	—	④	—	⑨
Single knuckle joint	—	⑤	—	⑥	—
Double knuckle joint	⑦	—	⑧	—	⑩

No.	Appearance	No.	Appearance
①	Single clevis + Double clevis	⑥	Single knuckle joint + Double knuckle joint
②	Single clevis + Double knuckle joint	⑦	Double knuckle joint + Single clevis
③	Double clevis + Single clevis	⑧	Double knuckle joint + Single knuckle joint
④	Double clevis + Single knuckle joint	⑨	Double clevis + Pivot bracket
⑤	Single knuckle joint + Double clevis	⑩	Double knuckle joint + Pivot bracket

Air Cylinder: Double Rod

Series MBW

ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order

MBW L 32 - 150 -

With auto switch **MDBW L 32 - 150 - M9BW -**

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)

Refer to page 300 for standard strokes.

Auto switch

Nil	Without auto switch
-----	---------------------

* For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 300.

Rod boot/Cushion

Rod boot	Nil	None
	J	Nylon tarpaulin (one end)
	JJ	Nylon tarpaulin (both ends)
	K	Heat resistant tarpaulin (one end)
Cushion	KK	Heat resistant tarpaulin (both ends)
	—	Both ends
	N*	None

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load												
					DC	AC	Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC											
Solid state switch	—	Grommet	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC											
				3-wire (PNP)				M9P	●	●	●	○	○													
		2-wire		—	—	—	—	—	—	—	—	—														
		—											J51			●	—	●	○	—						
	Terminal conduit	—	—	—	—	—	—	—	—	—	—	—	—													
														3-wire (NPN)		—	G39	—	—	—	—					
	Diagnostic indication (2-color indication)	Grommet	Yes	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	—	—	—	—	—	—		IC circuit										
					3-wire (PNP)				M9NW	●	●	●	○	○												
					2-wire				M9PW	●	●	●	○	○												
					3-wire (NPN)				M9BW	●	●	●	○	○												
3-wire (PNP)					M9NA				—	○	○	●	○	○												
2-wire					M9PA				—	○	○	●	○	○												
Water resistant (2-color indication)	Grommet	Yes	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	—	—	—	—	—	IC circuit													
				3-wire (PNP)				M9BA	—	○	○	●		○	○											
Diagnostic output (2-color indication)	Grommet	Yes	Yes	4-wire (NPN)	—	5 V, 12 V	—	F59F	●	—	●	○	○	IC circuit												
				2-wire (Non-polar)				P4DW	—	—	—	●	●		○	—										
Reed switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	24 V	5 V	—	A96	●	—	●	—	—	IC circuit												
								No	2-wire	24 V	12 V	—	—		—	—	—	—	—							
																				100 V	A93	●	—	●	—	—
																				100 V or less	A90	●	—	●	—	—
		Yes	2-wire	24 V	12 V	—	—	—	—	—	—	—	—													
														100 V, 200 V	A54	●	—	●	●	—						
		No	2-wire	24 V	12 V	—	—	—	—	—	—	—	—	—												
															200 V or less	A64	●	—	●	—	—					
Terminal conduit	—	—	—	—	—	—	—	—	—	—	—	—														
													—	A33	—	—	—	—	—							
DIN terminal	—	—	—	—	—	—	—	—	—	—	—	—														
													—	A34	—	—	—	—	—							
Diagnostic indication (2-color indication)	Grommet	Yes	Yes	3-wire (NPN)	—	—	—	A59W	●	—	●	—	—	IC circuit												
								—	—	—	—	—	—		—											

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
1 m M (Example) M9NWM
3 m L (Example) M9NWL
5 m Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 327.

* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1328 and 1329 for details.

* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled when being shipped.)

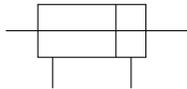
- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB
- MB1
- CA2
- CS1
- CS2

- D-□
- X□
- Individual -X□
- Technical data

Series MBW



JIS Symbol
Double acting



Made to Order Specifications
(For details, refer to pages
1373 to 1498.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat resistant cylinder (150°C)
-XC3	Special port position
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC22	Fluororubber seals
-XC30	Rod side trunnion
-XC35	With coil scraper

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000

Intermediate strokes are available.
(No spacer is used)

Specifications

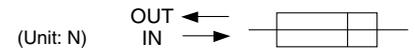
Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Max. operating pressure	1.0 MPa						
Min. operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Operating piston speed	50 to 1000 mm/s						50 to 700 mm/s
Allowable stroke tolerance	up to 250: $+1.0_0$, 251 to 1000: $+1.4_0$						
Cushion ^(Note)	Both ends (Air cushion)						
Port size (Rc, NPT, G)	1/8	1/4	3/8		1/2		
Mounting	Basic, Foot, Flange, Center trunnion						

Note) Absorbable kinetic energy by cushion mechanism is identical to double acting single rod.
In case of types with no air cushion, a rubber bumper is used.

Accessory

Mounting		Basic	Foot	Flange	Center trunnion
Standard	Rod end nut	●	●	●	●
Option	Single knuckle joint	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●
	Rod boot	●	●	●	●

Theoretical Force



Bore (mm)	Rod dia. (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)										
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
32	12	IN/OUT	691	138	207	276	346	415	484	553	622	691		
40	16	IN/OUT	1056	211	317	422	528	634	739	845	950	1056		
50	20	IN/OUT	1649	330	495	660	825	989	1154	1319	1484	1649		
63	20	IN/OUT	2803	561	841	1121	1402	1682	1962	2242	2523	2803		
80	25	IN/OUT	4536	907	1361	1814	2268	2722	3175	3629	4082	4536		
100	30	IN/OUT	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147		
125	32	IN/OUT	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468		

Note) Theoretical force (N) = Pressure (MPa) x Piston area (mm²)

Mass/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100	125
Basic mass	Basic	0.56	0.79	1.34	1.65	3.11	4.14	6.48
	Foot	0.6	0.93	1.56	1.93	3.61	4.8	8.56
	Flange	0.85	1.16	1.79	2.44	4.56	7.45	10.64
	Trunnion	0.85	1.15	1.82	2.45	4.66	7.81	9.46
Add'l mass per each 50 mm stroke	All mounting bracket	0.15	0.24	0.34	0.35	0.61	0.84	1.02
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation example: **MBWB32-100** (Basic, ø32, 100 st)

- Basic mass 0.56 (Basic, ø32)
 - Additional mass 0.15/50 stroke
 - Cylinder stroke 100 stroke
- $0.56 + 0.15 \times 100/50 = 0.86$ kg

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot itself.

Refer to pages 322 and 327 for cylinders with auto switches.

- Minimum stroke for auto switch mounting
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12

* Two foot brackets required for one cylinder.

Water Resistant Air Cylinder

Water resistant air cylinders are also available in Series MB, which are suitable for use on machine tools in an atmosphere with coolant and applicable to food machinery and automobile washing equipment in an environment with water splashes. Please refer to page 899 for more information.

Copper/Fluorine-free

20 – MBW Mounting bracket Bore size Port thread type — Stroke Suffix
 ↓
 Copper/Fluorine-free

Copper material has been replaced with non-copper material to prevent generation of copper ions. This is to eliminate influence of copper ions and fluororesin upon color CRT.

Specifications

Action	Double acting, Single rod
Bore size	ø32, ø40, ø50, ø63, ø80, ø100
Max. operating pressure	1 MPa
Min. operating pressure	0.05 MPa
Cushion	Air cushion*
Piping	Screw-in piping
Operating piston speed	50 to 1000 mm/s
Mounting bracket	Basic, Axial foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion

* Auto switch capable.

★ The cylinder should be operated within the allowable kinetic energy. (Refer to page 292.)

* In case of types with no air cushion, a rubber bumper is used.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

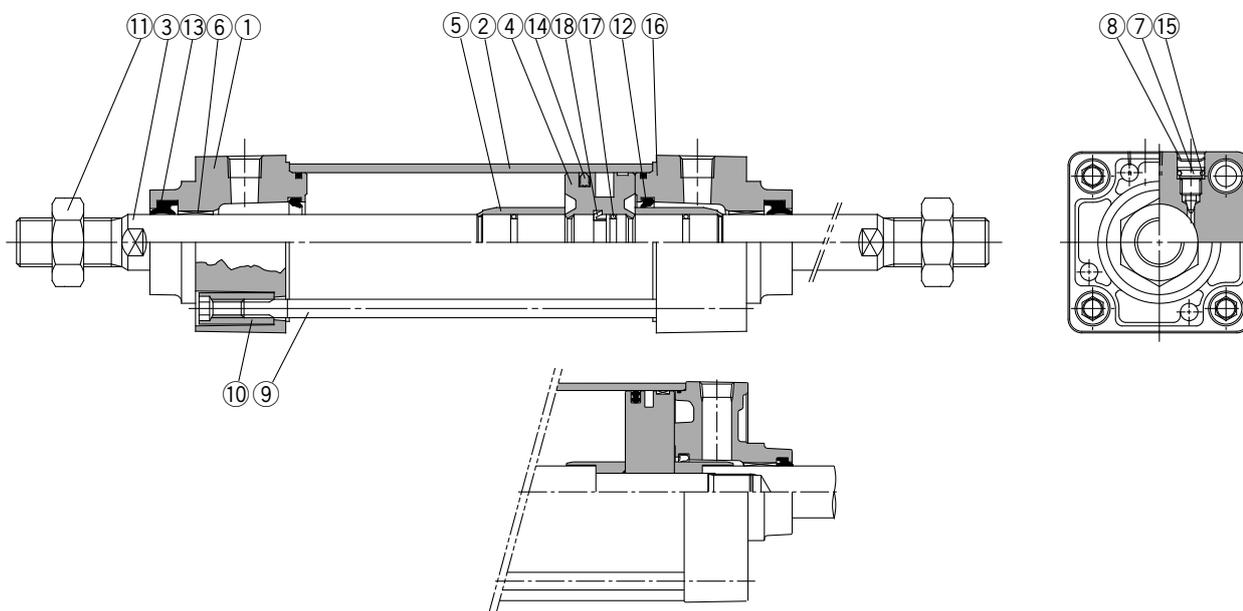
-X□

Individual
-X□

Technical
data

Series MBW

Construction



MBW125

Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum die-cast	Metallic painted
②	Cylinder tube	Aluminum alloy	Hard anodized
③	Piston rod	Carbon steel	Hard chrome plated
④	Piston	Aluminum alloy	Chromated
⑤	Cushion ring	Resin	
⑥	Bushing	Lead bronze cast	
⑦	Cushion valve	Steel wire	Nickel plated
⑧	Retaining ring	Steel for spring	ø40 to ø100
⑨	Tie rod	Carbon steel	Zinc-chromated
⑩	Tie rod nut	Carbon steel	Nickel plated
⑪	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
⑫*	Cushion seal	Urethane	
⑬*	Rod seal	NBR	
⑭*	Piston seal	NBR	
⑮	Cushion valve seal	NBR	
⑯*	Cylinder tube gasket	NBR	
⑰	Piston gasket	NBR	
⑱	Piston retainer	Urethane	

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBW32-PS	Set of the No. ⑫, ⑬, ⑭ and ⑯.
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	
125	MBW125-PS	

* Seal kits consist of items ⑫, ⑬, ⑭ and ⑯, and can be ordered by using the seal kit number corresponding to each bore size.

* Trunnion type should not be disassembled. (Refer to page 328.)

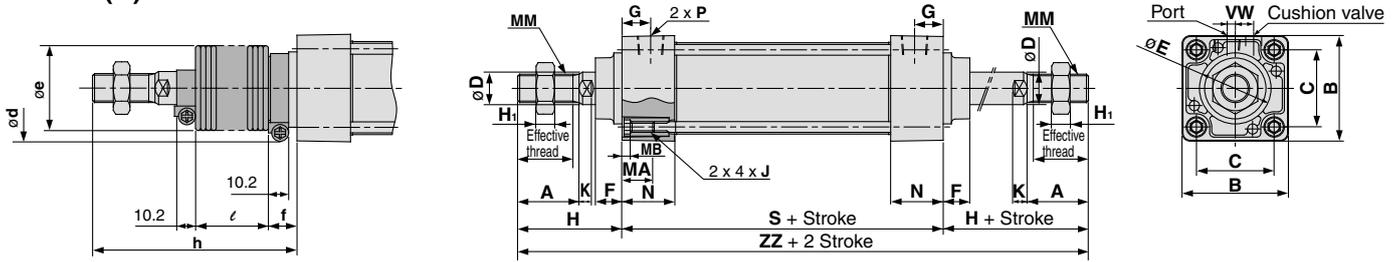
* Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).

Order with the following part number when only the grease pack is needed.

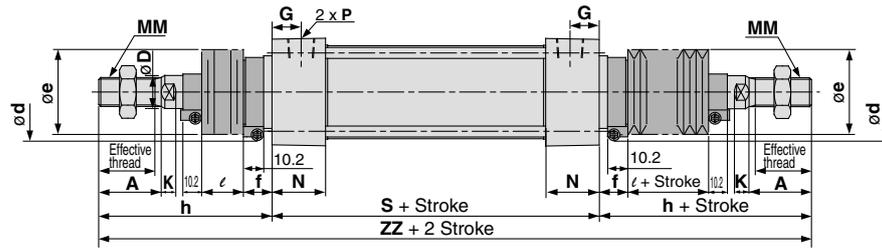
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

With Mounting Bracket

Basic: (B)



With rod boot



Bore (mm)	Stroke range	Eff. thread length	Width across flats	With Air Cushion																				Without Air Cushion	
				A	B	C	D	Ee11	F	G	H ₁	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*	S	ZZ
32	to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	178	90	184
40	to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	2	1/4	84	4	9	186	90	192
50	to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	210	102	218
63	to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	210	102	218
80	to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	258	124	268
100	to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	258	124	268
125	to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2.0	38	1/2	120	17	15	314	132	326

With Rod Boot

Bore (mm)	d	e	f	ℓ																h															
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000								
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	—								
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	—								
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—	—							
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—	—							
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—	—							
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—	—							
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	120	130	140	150	170	190	210	230	250	270	290	310	—							

Note) Dimension ZZ is with rod boot. (mm)

Bore (mm)	ZZ Note)											
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	230	256	280	306	356	406	456	—	—	—	—	—
40	246	272	296	322	372	422	472	—	—	—	—	—
50	272	298	322	348	398	448	498	548	—	—	—	—
63	272	298	322	348	398	448	498	548	—	—	—	—
80	316	342	366	392	442	492	542	592	642	692	—	—
100	316	342	366	392	442	492	542	592	642	692	—	—
125	340	360	380	400	440	480	520	560	600	640	680	720

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB**
- MB1
- CA2
- CS1
- CS2

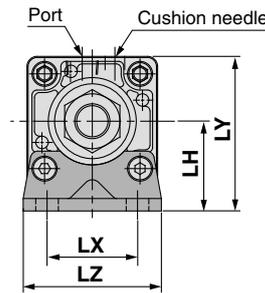
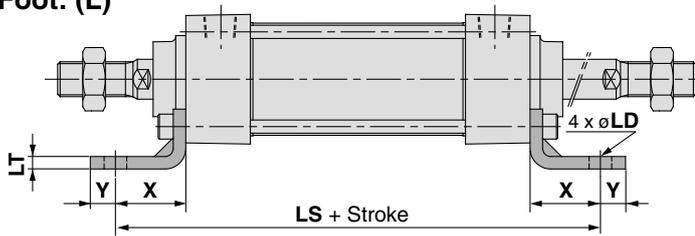
- D-□
- X□
- Individual -X□
- Technical data

Series MBW

With Mounting Bracket

* Refer to basic mounting (B) for other dimensions and with rod boot.

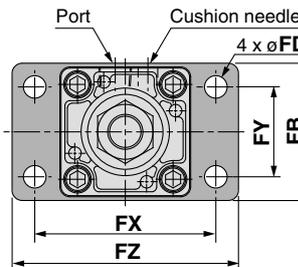
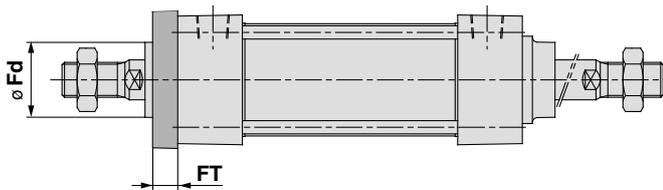
Foot: (L)



Foot

Bore (mm)	Stroke range	X	Y	LD	LH	LS*	LT	LX	LY	LZ
32	to 500	22	9	7	30	128	3.2	32	53	50
40	to 500	24	11	9	33	132	3.2	38	59	55
50	to 600	27	11	9	40	148	3.2	46	72.5	70
63	to 600	27	14	12	45	148	3.6	56	82.5	80
80	to 800	30	14	12	55	174	4.5	72	102.5	100
100	to 800	32	16	14	65	178	4.5	89	122	120
125	to 1000	45	20	14	81	210	8	90	149	136

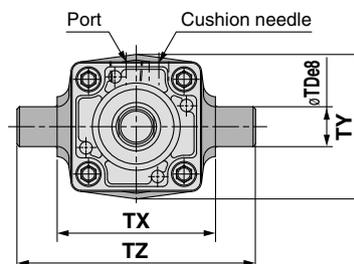
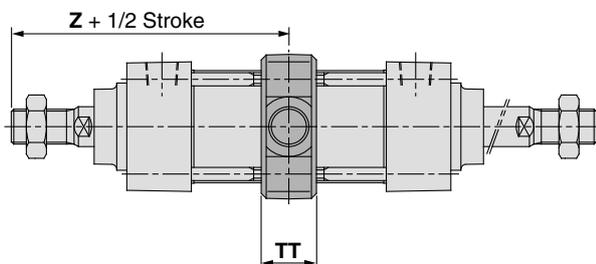
Front flange: (F)



Front Flange

Bore (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	Fd
32	to 500	50	7	10	64	32	79	25
40	to 500	55	9	10	72	36	90	31
50	to 600	70	9	12	90	45	110	38.5
63	to 600	80	9	12	100	50	120	39.5
80	to 800	100	12	16	126	63	153	45
100	to 800	120	14	16	150	75	178	54
125	to 1000	138	14	20	180	102	216	57.5

Center trunnion: (T)



Center Trunnion

Bore (mm)	Stroke range	TDe8	TT	TX	TY	TZ	Z**
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 800	20	34	110	110	150	129
100	to 800	25	40	132	136	182	129
125	to 1000	25	50	160	160	210	157

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;

ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

** Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;

ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm (For trunnion mounting)

Air Cylinder: Non-rotating Rod Type

Series MBK

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MBK **L** **32** **50**

With auto switch **MDBK** **L** **32** **50** **M9BW**

With auto switch
(Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 306 for standard strokes.

Auto switch

Nil	Without auto switch
-----	---------------------

* For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 306.

Rod boot/Cushion

Rod boot	Nil	None
	J	Nylon tarpaulin
Cushion	K	Heat resistant tarpaulin
	Nil	Both ends
	N*	None

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load					
					DC	AC	Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC				
Solid state switch	—	Grommet	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC				
				3-wire (PNP)				M9P	●	●	●	○	○						
		2-wire		—	—	—	—	—	—	—	—	—							
		—											J51			●	—	●	○
	Terminal conduit	—	—	—	—	—	—	—	—	—	—	—	—	—					
																3-wire (NPN)	—	G39	—
	Diagnostic indication (2-color indication)	Grommet	Yes	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○		IC circuit			
					3-wire (PNP)				M9PW	●	●	●	○	○					
					2-wire				M9BW	●	●	●	○	○					
					3-wire (NPN)				M9NA	—	○	○	●	○		○			
3-wire (PNP)					M9PA				—	○	○	●	○	○					
2-wire					M9BA				—	○	○	●	○	○					
Diagnostic output (2-color indication)	Grommet	Yes	No	4-wire (NPN)	—	5 V, 12 V	—	F59F	●	—	●	○	○	IC circuit					
Magnetic field resistant (2-color indication)				2-wire (Non-polar)				—	—	—	●	●	○	—					
Reed switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	24 V	5 V	—	A96	●	—	●	—	—	IC circuit	Relay, PLC				
				No				2-wire	24 V	12 V	100 V	A93	—	●		—	●	—	—
											100 V or less	A90	—	●		—	●	—	—
											100 V, 200 V	A54	—	●		—	●	●	—
											200 V or less	A64	—	●		—	●	—	—
		Terminal conduit	—	—	—	—	—	—	—	A33	—	—	—	—		—			
										—	A34	—	—	—		—	—	—	
		DIN terminal	Yes	—	—	—	—	—	—	—	—	—	—	—		—	PLC		
										—	A44	—	—	—		—	—	—	
										—	A59W	—	●	—		●	—	—	Relay, PLC

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
1 m M (Example) M9NWM
3 m L (Example) M9NWL
5 m Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 327.

* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1328 and 1329 for details.

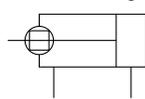
* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled when being shipped.)

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB
- MB1
- CA2
- CS1
- CS2
- D-□
- X□
- Individual -X□
- Technical data

Series MBK



JIS Symbol



Made to Order Specifications
(For details, refer to pages 1373 to 1498.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port position
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extend stroke
-XC9	Adjustable stroke cylinder/Adjustable retract stroke
-XC10	Dual stroke cylinder/Double rod
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC30	Rod side trunnion

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

Intermediate strokes are available.
(No spacer is used)

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	up to 250: $^{+1.0}_0$, 251 to 1000: $^{+1.4}_0$, 1001 to 1500: $^{+1.8}_0$					
Cushion <small>Note 1)</small>	Both ends (Air cushion)					
Port size (Rc, NPT, G)	1/8	1/4	3/8	1/2		
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					
Non-rotating accuracy	±0.5°		±0.5°		±0.3°	
Allowable rotating torque N·m max.	0.25	0.45	0.64	0.79	0.93	

Note 1) Absorbable kinetic energy by cushion mechanism is identical to double acting single rod. When requesting a cylinder without air cushion, cylinder utilizes rubber bumpers which increases cylinders overall length.

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Mass/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic	0.50	0.66	1.21	1.51	2.58	3.73
	Foot	0.62	0.83	1.41	1.75	3.23	4.36
	Flange	0.79	1.03	1.64	2.30	4.03	7.04
	Single clevis	0.75	0.89	1.55	2.14	3.69	6.90
	Double clevis	0.76	0.93	1.64	2.30	3.98	7.42
	Trunnion	0.79	1.02	1.69	2.31	4.13	7.40
Add'l mass per each 50 mm stroke	All mounting bracket	0.11	0.15	0.26	0.27	0.40	0.52
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation example: **MBKB32-100** (Basic, ø32, 100 st)

- Basic mass 0.50 (Basic ø32)
 - Additional mass 0.11/50 stroke
 - Cylinder stroke 100 stroke
- $0.50 + 0.11 \times 100/50 = 0.72 \text{ kg}$

Refer to pages 322 and 327 for cylinders with auto switches.

- Minimum stroke for auto switch mounting
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C *

* Max. ambient temperature for rod boot itself.

Theoretical Force

OUT side is identical to double acting single rod.
Refer to table below for IN side.

Bore size (mm)	Rod diameter (mm ²)	Bore size (mm)	Rod diameter (mm ²)
32	675	63	2804
40	1082	80	4568
50	1651	100	7223

Theoretical force (N) =
Pressure (MPa) x Piston area (mm²)

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot ^{Note 1)}	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) Two foot brackets required for one cylinder.

Note 2) Accessories for each mounting bracket are as follows:

Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 298 for details.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

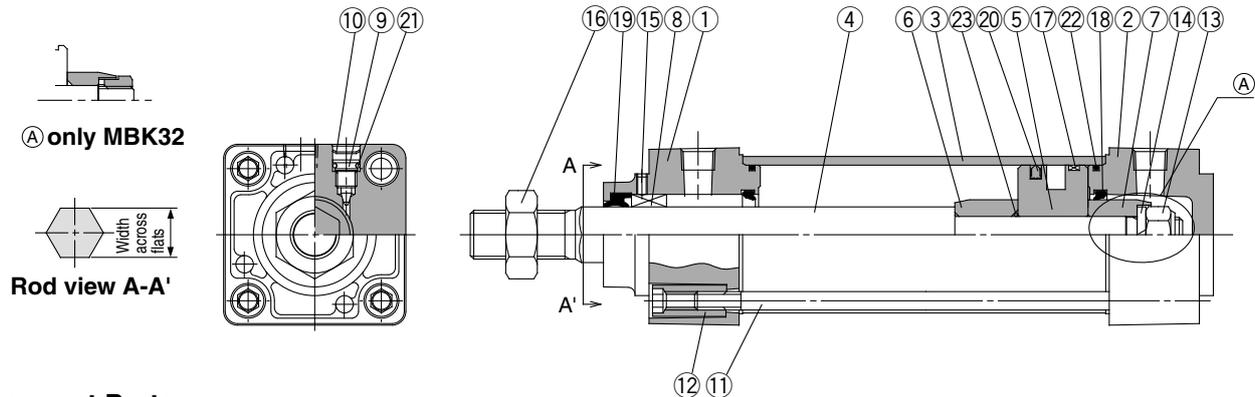
-X□

Individual
-X□

Technical
data

Series MBK

Construction



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum die-cast	Metallic painted
②	Head cover	Aluminum die-cast	Metallic painted
③	Cylinder tube	Aluminum alloy	Hard anodized
④	Piston rod	Stainless steel	
⑤	Piston	Aluminum alloy	Chromated
⑥	Cushion ring A	Rolled steel	
⑦	Cushion ring B	Rolled steel	
⑧	Non-rotating guide bearing	Oil-impregnated sintered alloy	
⑨	Cushion valve	Steel wire	Nickel plated
⑩	Retaining ring	Steel for spring	ø40 to ø100
⑪	Tie rod	Carbon steel	Zinc-chromated
⑫	Tie rod nut	Carbon steel	Nickel plated

No.	Description	Material	Note
⑬	Piston nut	Rolled steel	
⑭	Washer	Steel wire	
⑮	Lock nut	Steel wire	
⑯	Rod end nut	Carbon steel	Nickel plated
⑰	Wear ring	Resin	
⑱*	Cushion seal	Urethane	
⑲*	Rod seal	NBR	
⑳*	Piston seal	NBR	
㉑	Cushion valve seal	NBR	
㉒*	Cylinder tube gasket	NBR	
㉓	Piston gasket	NBR	

Replacement Parts/Seal Kit

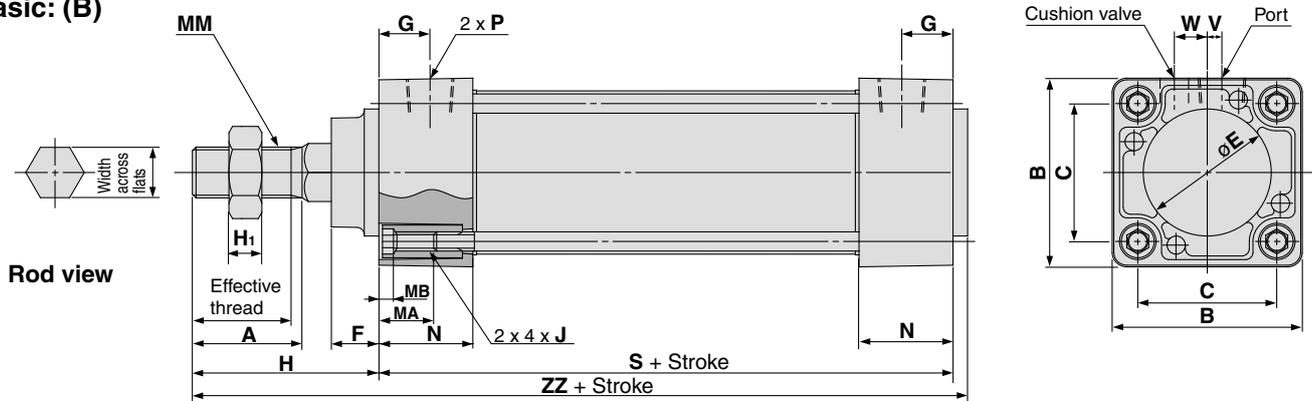
Bore size (mm)	Kit no.	Contents
32	MBK32-PS	Set of the No. ⑱, ⑲, ⑳ and ㉑.
40	MBK40-PS	
50	MBK50-PS	
63	MBK63-PS	
80	MBK80-PS	
100	MBK100-PS	

* Seal kits consist of items ⑱, ⑲, ⑳ and ㉑, and can be ordered by using the seal kit number corresponding to each bore size.
 * Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
 Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows
 ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm

Without Mounting Bracket

Basic: (B)



Bore (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	E	F	G	H ₁	H	MA	MB	J	MM	N	P	S*	V	W	ZZ*
32	up to 500	19.5	12.2	22	46	32.5	30	13	13	6	47	16	4	M6 x 1	M10 x 1.25	27	1/8	84	4	6.5	135
40	up to 500	27	14.2	30	52	38	35	13	14	8	51	16	4	M6 x 1	M14 x 1.5	27	1/4	84	4	9	139
50	up to 600	32	19	35	65	46.5	40	14	15.5	11	58	16	5	M8 x 1.25	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	up to 600	32	19	35	75	56.5	45	14	16.5	11	58	16	5	M8 x 1.25	M18 x 1.5	31.5	3/8	94	9	12	156
80	up to 800	37	23	40	95	72	45	20	19	13	72	16	5	M10 x 1.5	M22 x 1.5	38	3/8	114	11.5	14	190
100	up to 800	37	27	40	114	89	55	20	19	16	72	16	5	M10 x 1.5	M26 x 1.5	38	1/2	114	17	15	190

Dimensions with mounting support is same as the basic style (Double acting single rod). Also dimensions with boot is same as the basic style (Double acting, Single rod).

Air Cylinder: Low Friction Type

Series MB□Q

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MB L Q 32 □ - 50 F - □

With auto switch **MDB L Q 32 □ - 50 F - M9BW □ - □**

With auto switch
(Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Auto switch

Nil	Without auto switch
-----	---------------------

* For applicable auto switches, refer to the table below.

Direction of low friction

F	With pressure at head side
B	With pressure at rod side

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 310.

Cylinder stroke (mm)
Refer to page 310 for standard strokes.

Port thread type

Nil	Rc
TN	NPT
TF	G

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch. (Example) MDBBQ40-100

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load				
					DC	AC	Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC			
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC			
				3-wire (PNP)				M9P	●	●	●	○	○					
		2-wire		100 V, 200 V	M9B	●	●	●	○	○								
		J51			●	—	●	○	—									
	Terminal conduit	3-wire (NPN)	5 V, 12 V	—	G39	—	—	—	—	—	—	—	—					
		2-wire		—	K39	—	—	—	—	—	—	—						
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○	IC circuit				
				3-wire (PNP)				M9PW	●	●	●	○	○	—				
	Water resistant (2-color indication)	Grommet	Yes	2-wire	12 V	—	—	M9BW	●	●	●	○	○	—				
				3-wire (NPN)				M9NA	—	○	○	●	○	○		IC circuit		
Diagnostic output (2-color indication)	Grommet	Yes	3-wire (PNP)	5 V, 12 V	—	—	M9PA	—	○	○	○	○	—					
			2-wire				M9BA	—	○	○	●	○	○	—				
Magnetic field resistant (2-color indication)	Grommet	Yes	4-wire (NPN)	5 V, 12 V	—	—	F59F	●	—	●	○	○	IC circuit					
			2-wire (Non-polar)				P4DW	—	—	—	●	●	○	—				
Reed switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	24 V	5 V	—	A96	●	—	●	—	—	IC circuit	Relay, PLC			
				No				2-wire	100 V	A93	—	●	—	●		—	—	—
									100 V or less	A90	—	●	—	●		—	—	IC circuit
									100 V, 200 V	A54	—	●	—	●		●	—	—
		Yes	2-wire	200 V or less	A64	—	●	—	●	—	—	—						
				—	—	A33	—	—	—	—	—	—						
		Terminal conduit	Yes	2-wire	100 V, 200 V	—	—	—	—	—	—	—	—	—				
					—	—	A34	—	—	—	—	—	—	—				
DIN terminal	Yes	2-wire	100 V, 200 V	—	—	—	—	—	—	—	—	—	—					
			—	—	A44	—	—	—	—	—	—	—						
Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	—	—	—	A59W	●	—	●	—	—	IC circuit					
			2-wire (Non-polar)				—	—	—	—	—	—	—	—				

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
1 m M (Example) M9NWM
3 m L (Example) M9NWL
5 m Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 327.

* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1328 and 1329 for details.

* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled when being shipped.)

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

-X□

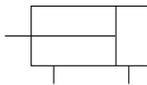
Technical

data

Series MB□Q



JIS Symbol
Double acting



Made to Order Specifications
(For details, refer to pages 1373 to 1498.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port position
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion

Refer to pages 322 and 327 for cylinders with auto switches.

- Minimum stroke for auto switch mounting
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting single rod					
Direction of low friction	One direction ^{Note 1)}					
Fluid	Air					
Proof pressure	1.05 MPa					
Max. operating pressure	0.7 MPa					
Min. operating pressure	0.025 MPa (ø32)	0.01 MPa (ø40 to ø100)				
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Cushion	None					
Port size (Rc, NPT, G)	1/8	1/4	3/8	1/2		
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					
Allowable leakage	0.5 ℓ/min (ANR) or less					

Note 1) Please refer to Selection Guide for the Low Friction Side.

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

Intermediate strokes are available. (No spacer is used.)

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●	●

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot ^{Note 1)}	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) Two foot brackets required for one cylinder.

Note 2) Accessories for each mounting bracket are as follows:

Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 298 for details.

Mass/Aluminum Tube (kg)

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic	0.50	0.69	1.19	1.47	2.73	3.7
	Foot	0.68	0.93	1.56	1.93	3.61	4.8
	Flange	0.79	1.06	1.64	2.26	4.18	7.01
	Single clevis	0.75	0.92	1.53	2.1	3.84	6.87
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37
Additional mass per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single rod clevis	0.15	0.23	0.26	0.26	0.60	0.83
	Double rod clevis (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation example: **MBBQ32-100** (Basic, ø32, 100 st)

- Basic mass 0.50 (Basic, ø32)
- Additional mass 0.11/50 stroke
- Cylinder stroke 100 stroke

$$0.50 + 0.11 \times 100/50 = 0.72 \text{ kg}$$

Selection Guide for the Low Friction Side

- When used as a balancer etc., follow the example of the application mentioned earlier applying pressure at one port while leaving the other port open to atmosphere.

With pressure at rod cover port

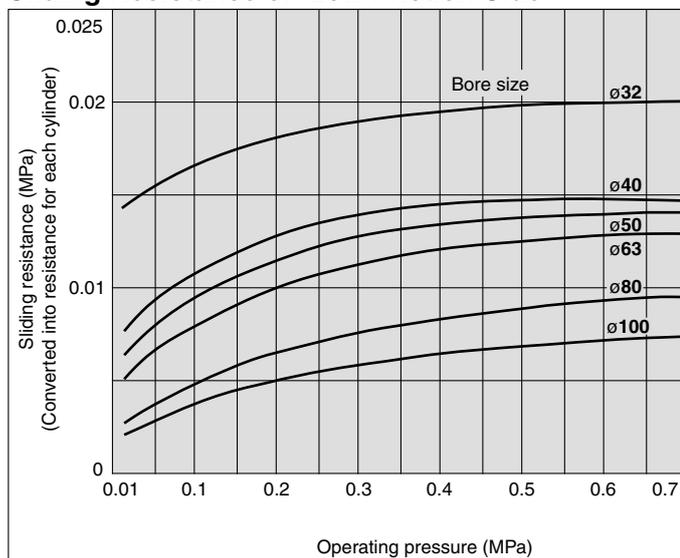
..... Low friction side B (Example of application ①)

With pressure at head cover port

..... Low friction side F (Example of application ②)

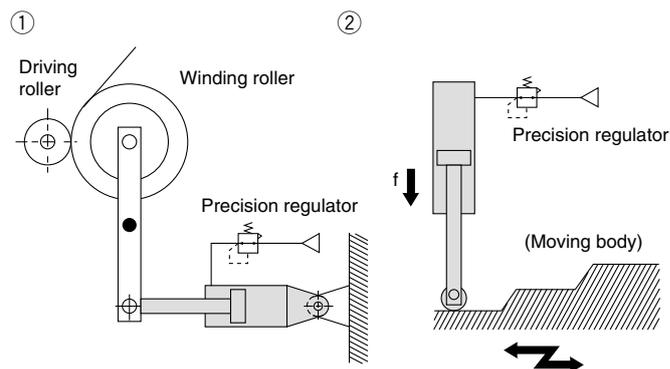
In both cases, as long as the outside pressure moves the piston rod, low friction can result in the direction of extension and retraction.

Sliding Resistance on Low Friction Side



Application Example

Low friction cylinder used in combination with precision regulator (Series IR)



Caution on Use

Warning

- In the direction of low friction operation, speed control must be effected by the meter-in system.

With meter-out control, the exhaust pressure will increase and create a greater sliding resistance.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

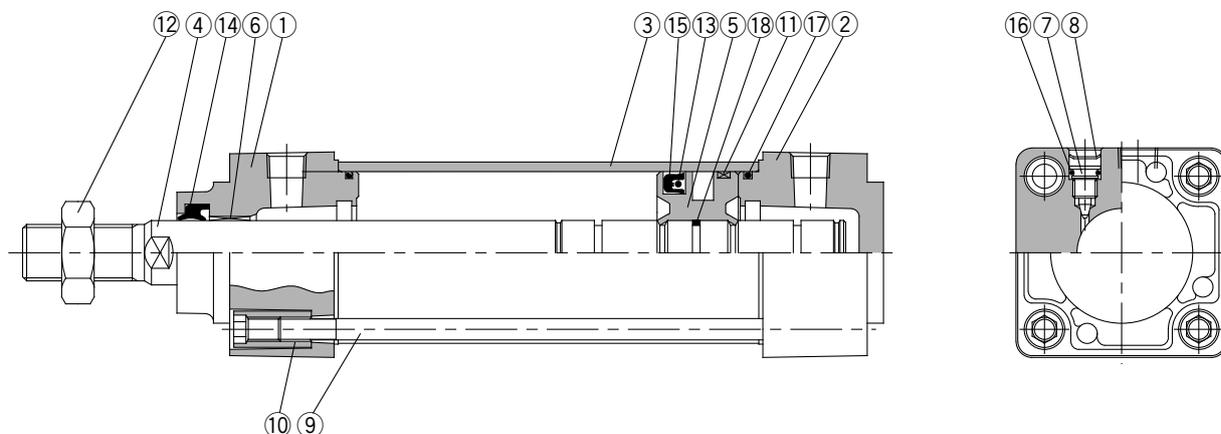
D-□

-X□

Individual
-X□

Technical
data

Construction



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum die-cast	Metallic painted
②	Head cover	Aluminum die-cast	Metallic painted
③	Cylinder tube	Aluminum alloy	Hard anodized
④	Piston rod	Carbon steel	Hard chrome plated
⑤	Piston	Aluminum alloy	Chromated
⑥	Bushing	Lead bronze cast	
⑦	Cushion valve	Steel wire	Nickel plated
⑧	Retaining ring	Steel for spring	ø40 to ø100
⑨	Tie rod	Carbon steel	Zinc chromated
⑩	Tie rod nut	Carbon steel	Nickel plated
⑪	Wear ring	Resin	
⑫	Rod end nut	Carbon steel	Nickel plated
⑬*	Back up O ring	NBR	
⑭*	Rod seal	NBR	
⑮*	Piston seal	NBR	
⑯	Cushion valve seal	NBR	
⑰*	Cylinder tube gasket	NBR	
⑱	Piston gasket	NBR	

Replacement Parts/Seal Kit

Bore (mm)	Kit no.	Contents
32	MBQ32-PS	Set of the No. ⑬, ⑭, ⑮ and ⑰
40	MBQ40-PS	
50	MBQ50-PS	
63	MBQ63-PS	
80	MBQ80-PS	
100	MBQ100-PS	

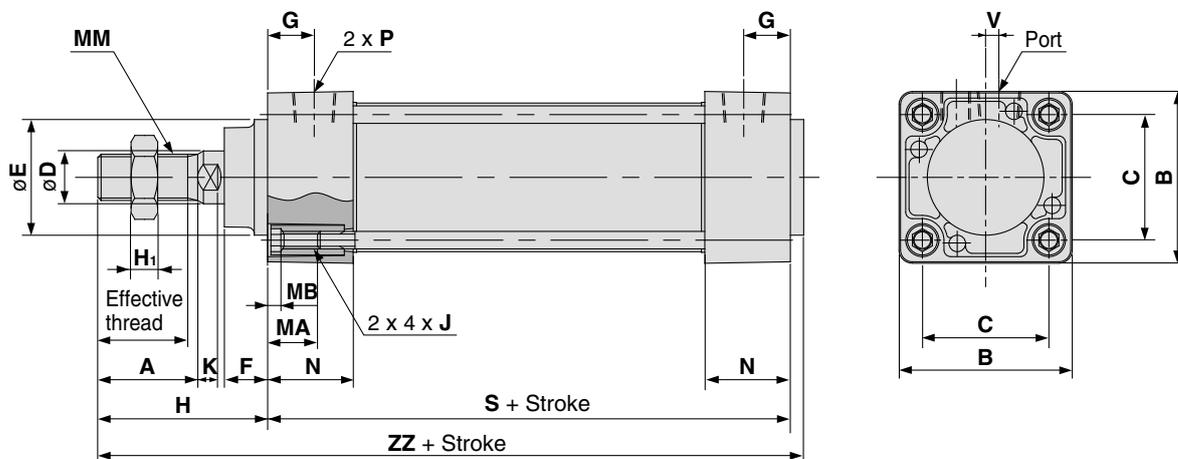
* Seal kits consist of items ⑬, ⑭, ⑮ and ⑰, and can be ordered by using the seal kit number corresponding to each bore size.

* Trunnion type should not be disassembled. (Refer to page 328.)

* Since the seal kit does not include a grease pack, order it separately.

Grease pack part number: GR-L-020 (20 g)

Basic: (B)



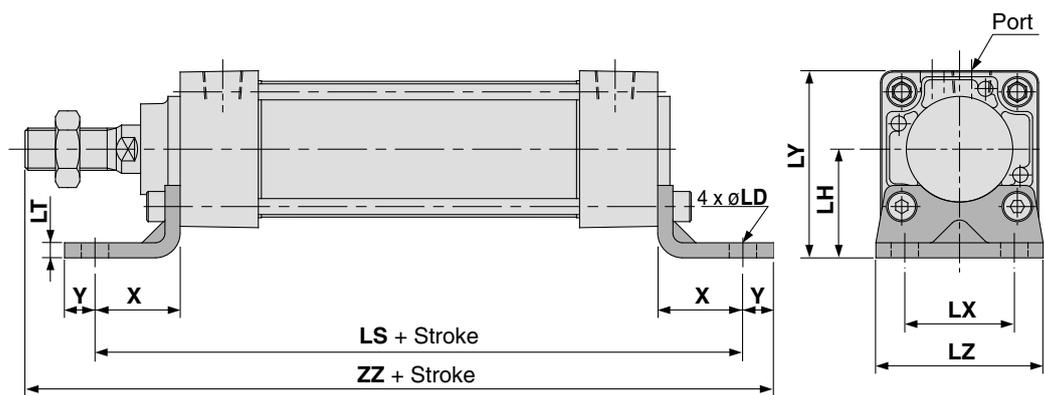
Bore (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H ₁	H	MA	MB	J	K	MM	N	P	S	V	ZZ
32	up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	135
40	up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	139
50	up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	156
63	up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	156
80	up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	190
100	up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	190

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB
- MB1
- CA2
- CS1
- CS2

With Mounting Bracket

* Refer to basic mounting (B) for other dimensions and with rod boot.

Foot: (L)



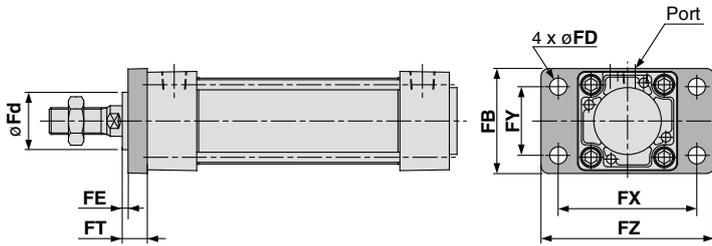
Bore size (mm)	Stroke range	X	Y	LD	LH	LS	LT	LX	LY	LZ	ZZ
32	to 700	22	9	7	30	128	3.2	32	53	50	162
40	to 800	24	11	9	33	132	3.2	38	59	55	170
50	to 1000	27	11	9	40	148	3.2	46	72.5	70	190
63	to 1000	27	14	12	45	148	3.6	56	82.5	80	193
80	to 1000	30	14	12	55	174	4.5	72	102.5	100	230
100	to 1000	32	16	14	65	178	4.5	89	122	120	234

- D-□
- X□
- Individual
- X□
- Technical data

Series MB□Q

With Mounting Bracket

Front flange: (F)

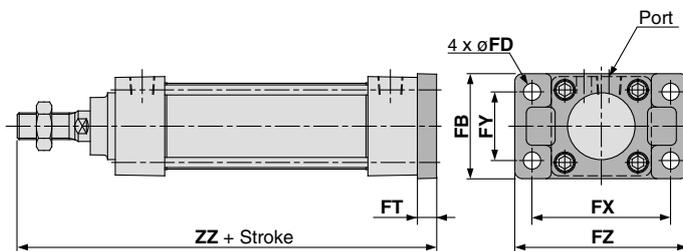


Front Flange

(mm)

Bore size (mm)	Stroke range	B	FD	FE	FT	FX	FY	FZ	Fd
32	to 700	50	7	3	10	64	32	79	25
40	to 800	55	9	3	10	72	36	90	31
50	to 1000	70	9	2	12	90	45	110	38.5
63	to 1000	80	9	2	12	100	50	120	39.5
80	to 1000	100	12	4	16	126	63	153	45
100	to 1000	120	14	4	16	150	75	178	54

Rear flange: (G)

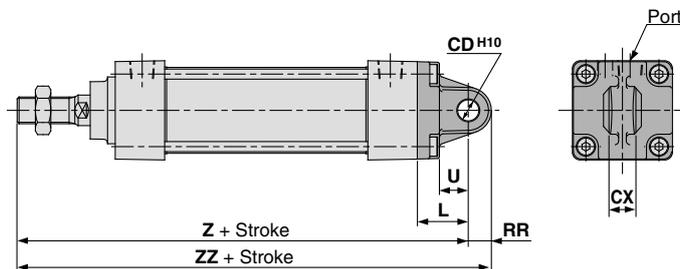


Rear Flange

(mm)

Bore size (mm)	Stroke range	B	FD	FT	FX	FY	FZ	ZZ
32	to 500	50	7	10	64	32	79	141
40	to 500	55	9	10	72	36	90	145
50	to 600	70	9	12	90	45	110	164
63	to 600	80	9	12	100	50	120	164
80	to 750	100	12	16	126	63	153	202
100	to 750	120	14	16	150	75	178	202

Single clevis: (C)

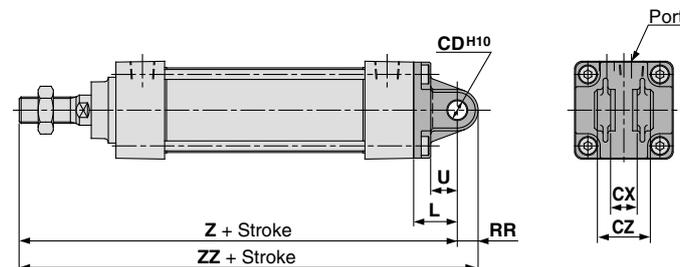


Single Clevis

(mm)

Bore size (mm)	Stroke range	L	RR	U	CD ^{H10}	CX ^{-0.1/-0.3}	Z	ZZ
32	to 500	23	10.5	13	10	14	154	164.5
40	to 500	23	11	13	10	14	158	169
50	to 600	30	15	17	14	20	182	197
63	to 600	30	15	17	14	20	182	197
80	to 750	42	23	26	22	30	228	251
100	to 750	42	23	26	22	30	228	251

Double clevis: (D)

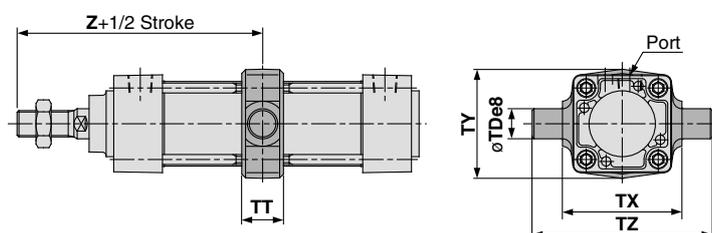


Double Clevis

(mm)

Bore size (mm)	Stroke range	L	RR	U	CD ^{H10}	CX ^{-0.3/-0.1}	CZ	Z	ZZ
32	to 500	23	10.5	13	10	14	28	154	164.5
40	to 500	23	11	13	10	14	28	158	169
50	to 600	30	15	17	14	20	40	182	197
63	to 600	30	15	17	14	20	40	182	197
80	to 750	42	23	26	22	30	60	228	251
100	to 750	42	23	26	22	30	60	228	251

Center trunnion: (T)



Center Trunnion

(mm)

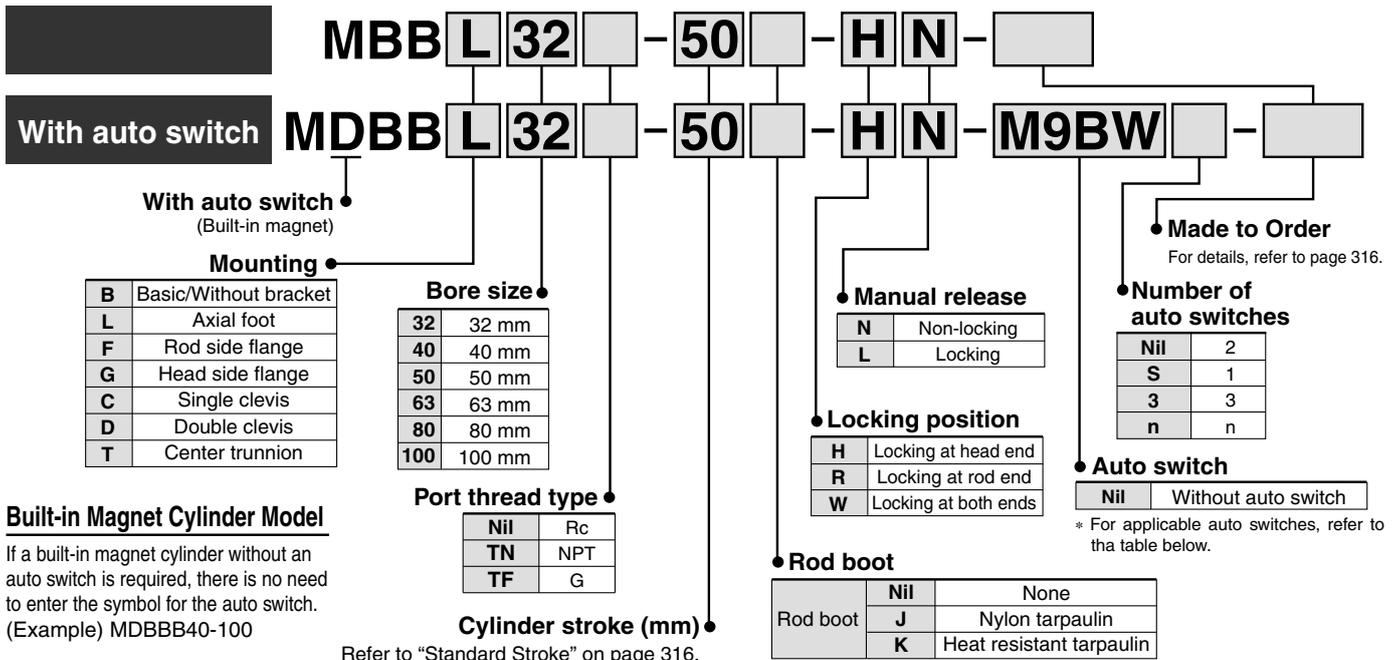
Bore size (mm)	Stroke range	TDe ₈	TT	TX	TY	TZ	Z
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 750	20	34	110	110	150	129
100	to 750	25	40	132	136	182	129

Air Cylinder: With End Lock

Series *MBB*

ø32, ø40, ø50, ø63, ø80, ø100

How to Order



Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch. (Example) MDBBB40-100

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load						
					DC	AC	Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC					
Solid state switch	—	Grommet	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	—					
				3-wire (PNP)				M9P	●	●	●	○	○							
		2-wire		100 V, 200 V	M9B	●	●	●	○	○										
		J51			●	—	●	○	—											
	Terminal conduit	—	—	—	—	—	—	G39	—	—	—	—	—	—	—					
								K39	—	—	—	—	—							
	Diagnostic indication (2-color indication)	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○	IC circuit	Relay, PLC				
					3-wire (PNP)				M9PW	●	●	●	○	○						
					2-wire				M9BW	●	●	●	○	○						
					3-wire (NPN)				M9NA	○	○	●	○	○						
3-wire (PNP)					M9PA				○	○	●	○	○							
2-wire					M9BA				○	○	●	○	○							
Diagnostic output (2-color indication)	—	Grommet	No	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	●	—	●	○	○	IC circuit	—					
				2-wire (Non-polar)				P4DW	—	—	●	●	○			—				
Reed switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	24 V	5 V	—	A96	●	—	●	—	—	IC circuit	—					
				No				2-wire	100 V	A93	●	—	●			—	—	IC circuit	Relay, PLC	
										100 V or less	A90	●	—			●	—			—
										100 V, 200 V	A54	●	—			●	●			—
		Terminal conduit	—	—	—	—	—	—	—	A64	●	—	●	—	—	—				
										200 V or less	A33	—	—	—			—	—		
		DIN terminal	—	—	Yes	2-wire	24 V	—	—	A34	—	—	—	—	—	PLC				
										100 V, 200 V	A44	—	—	—			—	—		
Diagnostic indication (2-color indication)	—	Grommet	No	2-wire	24 V	—	—	A59W	●	—	●	—	—	Relay, PLC						
								—	—	—	—	—			—					

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
1 m M (Example) M9NWM
3 m L (Example) M9NWL
5 m Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 327.

* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1328 and 1329 for details.

* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled when being shipped.)

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

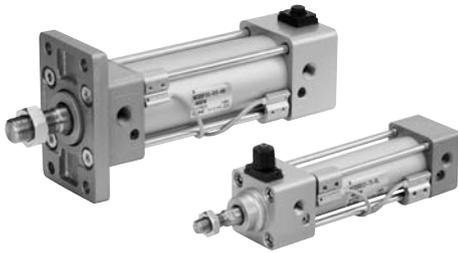
Individual

-X□

Technical

data

Series MBB



Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.15 MPa *					
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	up to 250: ${}^{+1.0}_0$, 251 to 1000: ${}^{+1.4}_0$, 1001 to 1500: ${}^{+1.8}_0$					
Cushion	Both ends (Air cushion)					
Port size (Rc, NPT, G)	1/8	1/4	3/8	1/2		
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					

* 0.05 MPa except locking parts.



Made to Order Specifications
(For details, refer to pages 1373 to 1498.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC10	Dual stroke cylinder/Double rod
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion

Refer to pages 322 and 327 for cylinders with an auto switch.

- Minimum stroke for auto switch mounting
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Locking Specifications

Locking position	Head end, rod end, both ends					
	ø32	ø40	ø50	ø63	ø80	ø100
Holding force (Max.) N	550	860	1340	2140	3450	5390
Back lash	1.5 mm or less					
Manual release	Non-locking type, locking type					

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
	Locking release bolt (N type only)	●	●	●	●	●	●	●
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Standard Stroke

Bore (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

Intermediate strokes are available. (No spacer is used.)

Mass/Aluminum Tube (kg)

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic	0.50	0.69	1.19	1.47	2.73	3.7
	Foot	0.68	0.93	1.56	1.93	3.61	4.8
	Flange	0.79	1.06	1.64	2.26	4.18	7.01
	Single clevis	0.75	0.92	1.53	2.1	3.84	6.87
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37
Additional mass per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Additional Mass of Locking Part (kg)

Bore size (mm)		32	40	50	63	80	100
Manual release non-locking (N)	Locking at head end (H)	0.08	0.13	0.21	0.30	0.75	1.1
	Locking at rod end (R)	0.08	0.13	0.20	0.29	0.71	1.03
	Locking at both ends (W)	0.16	0.26	0.41	0.59	1.46	2.13
Manual release locking (L)	Locking at head end (H)	0.09	0.15	0.23	0.32	0.78	1.13
	Locking at rod end (R)	0.09	0.15	0.22	0.31	0.74	1.06
	Locking at both ends (W)	0.18	0.30	0.45	0.63	1.52	2.19

Calculation example: **MBL32-100-HN**

- Basic mass 0.68
 - Additional mass 0.11/50 stroke
 - Cylinder stroke 100 stroke
 - Locking mass 0.08 (Locking at head end, manual release non-locking type)
- $0.68 + 0.11 \times 100/50 + 0.08 = 0.98 \text{ kg}$

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot ^{Note 1)}	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) Two foot brackets required for one cylinder.

Note 2) Accessories for each mounting bracket are as follows:

Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 298 for details.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

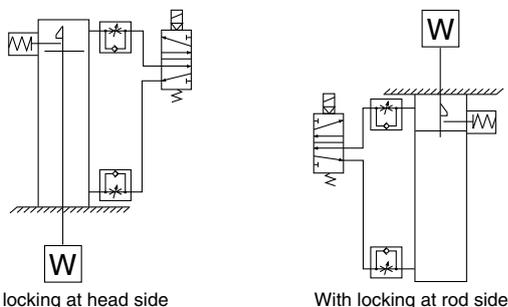
Technical
data

Cautions for Using

1. Use recommended pneumatic circuit

⚠ Caution

For correct operation of the locking and release mechanism, please use the following pneumatic circuit.



① Do not use a 3 position solenoid valve.

Avoid using circuit with 3 position solenoid valve (especially closed center). When pressure is trapped in the port with locking mechanism, end lock is free. When utilizing a 3 position closed center valve, even if the lock is engaged, it may become unlocked due to pressure leakage either across the piston or the valve spool.

② Back pressure is required to release end lock.

Be sure air is supplied to side of cylinder without the locking mechanism, as above, prior to supplying air pressure to the side with end lock or lock may not be released. (Refer to "Release of lock".)

③ Release lock when mounting or adjusting the cylinder.

If mounting is done with lock engaged, lock mechanism may be damaged.

④ Use with load 50% or less of rated capacity.

If cylinder is used at 50% load capacity or more, lock may be damaged.

⑤ Do not use two cylinders in parallel at same time.

Avoid to using 2 or more end lock cylinders at same time to perform a single task because binding may occur and one of the cylinders end lock may not release.

⑥ Use a speed controller as meter-out.

Meter-in control may not allow lock to release.

⑦ Use complete stroke or cylinder at side with end lock.

If cylinder piston does not reached end of stroke, end lock may not lock or release.

2. Operating pressure

⚠ Caution

Use pressures over 0.15 MPa at port with locking mechanism.

3. Exhaust speed

⚠ Caution

When pressures at port with locking mechanism is decrease to 0.05 MPa or less, it is automatically locked. When exhaust pipe at port with locking mechanism is thin and long or speed controller is separated from cylinder port, exhaust speed is slow and will require additional time for lock engagement. Clogging the silencer mounted on exhaust port of solenoid valve leads to same result.

4. Relationship with cushion

⚠ Caution

When cushion valve at side with locking mechanism is fully opened or closed, piston rod may reached at stroke end. Thus lock is not established. And when locking is done at cushion valve fully closed, adjust cushion valve since lock may not be released.

5. Release of lock

⚠ Warning

When lock is to be released, supply air pressure to the port without the locking mechanism, this relieves the load from the lock mechanism. Then supply pressure to the port with lock, releasing the lock and changing cylinder direction.

(Refer to recommended pneumatic circuit.) When port without lock mechanism is exhausted and locking mechanism is loaded, the lock may be damaged due to excessive force on lock during release. Piston rod will operate immediately.

6. Manual release

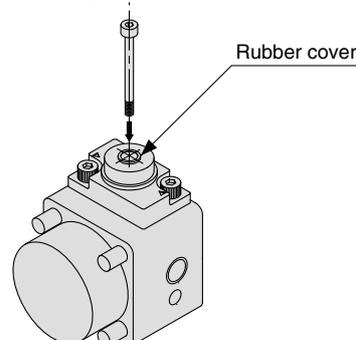
⚠ Caution

Non-locking type

Insert attached bolt from upper side of rubber cover (no need to remove rubber cover), tighten locking piston and pull bolt, locking will be released. When bolt is released, locking begins to take place. Thread size, required pulling force and stroke are listed below.

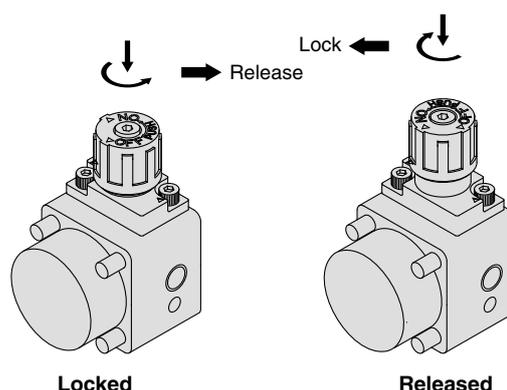
Bore size (mm)	Thread size	Pulling force	Stroke (mm)
32	≥ M2.5 x 0.45 x 25 ℓ	4.9 N	2
40, 50, 63	≥ M3 x 0.5 x 30 ℓ	10 N	3
80, 100	≥ M5 x 0.8 x 40 ℓ	24.5 N	3

* Remove bolt under normal operations.
It may cause malfunction of locking and release.



Locking style

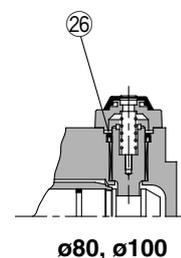
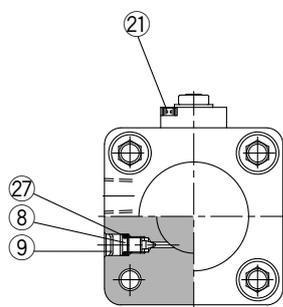
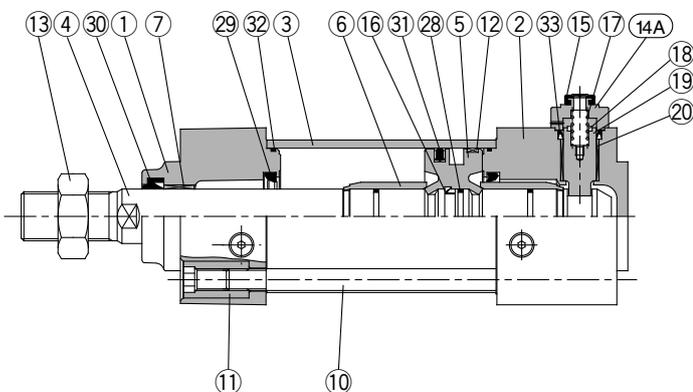
Turn 90° to counterclockwise pushing M/O button. Lock is released when ▲ on cap and ▼ OFF mark on M/O button correspond. (Lock remains released.) When locking is desired, turn M/O button clockwise 90° while pushing fully, correspond ▲ on cap and ▼ ON mark on M/O button. The correct position is confirmed by click sound "click".
If not confirmed, locking is not done.



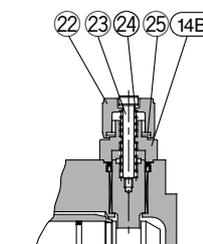
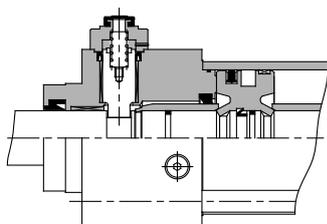
Construction

Locking at head end

Manual release non-locking type: N



Locking at rod end



Manual release non-locking type: L

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB**
- MB1
- CA2
- CS1
- CS2

Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Metallic painted
②	Head cover	Aluminum alloy	Metallic painted
③	Cylinder tube	Aluminum alloy	Hard anodized
④	Piston rod	Carbon steel	Hard chrome plated
⑤	Piston	Aluminum alloy	Chromated
⑥	Cushion ring	Brass	
⑦	Bushing	Lead bronze casted	
⑧	Cushion valve	Steel wire	Nickel plated
⑨	Retaining ring	Steel for spring	ø40 to ø100
⑩	Tie rod	Carbon steel	Chromated
⑪	Tie rod nut	Carbon steel	Nickel plated
⑫	Wear ring	Resin	
⑬	Rod end nut	Carbon steel	Nickel plated
⑭A	Cover A	Aluminum alloy	Painted black
⑭B	Cover B	Carbon steel	Tuffride
⑮	Rubber cover	Synthetic rubber	
⑯	Piston holder	Urethane	

Component Parts

No.	Description	Material	Note
⑰	Lock spring	Steel wire	
⑱	Bumper	Urethane	
⑲	Lock piston	Carbon steel	Hardened, Hard chrome plated
⑳	Lock bushing	Copper alloy	
㉑	Bolt with hex. hole	Alloyed steel	Black zinc chromated
㉒	M/O knob	Zinc alloy	Painted black
㉓	M/O bolt	Alloyed steel	Black zinc chromated, Painted red
㉔	M/O spring	Steel wire	Zinc chromated
㉕	Stopper ring	Carbon steel	Zinc chromated
㉖	Seal retainer	Rolled steel	ø80, ø100 only
㉗	Cushion valve seal	NBR	
㉘	Piston gasket	NBR	
㉙*	Cushion seal	Urethane	
㉚*	Rod seal	NBR	
㉛*	Piston seal	NBR	
㉜*	Cylinder tube gasket	NBR	
㉝*	Lock piston seal	NBR	

Replacement Parts/Seal Kit (Locking at head or rod end)

Bore size (mm)	Kit no.	Contents
32	MBB32-PS	Set of the No. ㉙, ㉚, ㉛, ㉜ and ㉝.
40	MBB40-PS	
50	MBB50-PS	
63	MBB63-PS	
80	MBB80-PS	
100	MBB100-PS	

Replacement Parts/Seal Kit (Locking at both ends)

Bore size (mm)	Kit no.	Contents
32	MBB32-PS-W	Set of the No. ㉙, ㉚, ㉛, ㉜ and ㉝.
40	MBB40-PS-W	
50	MBB50-PS-W	
63	MBB63-PS-W	
80	MBB80-PS-W	
100	MBB100-PS-W	

- * Seal kits consist of items ㉙ to ㉝, and can be ordered by using the seal kit number corresponding to each bore size.
- * Trunnion type should not be disassembled. (Refer to page 328.)
- * Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100: 30 g).
- Order with the following part number when only the grease pack is needed.
- Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)**

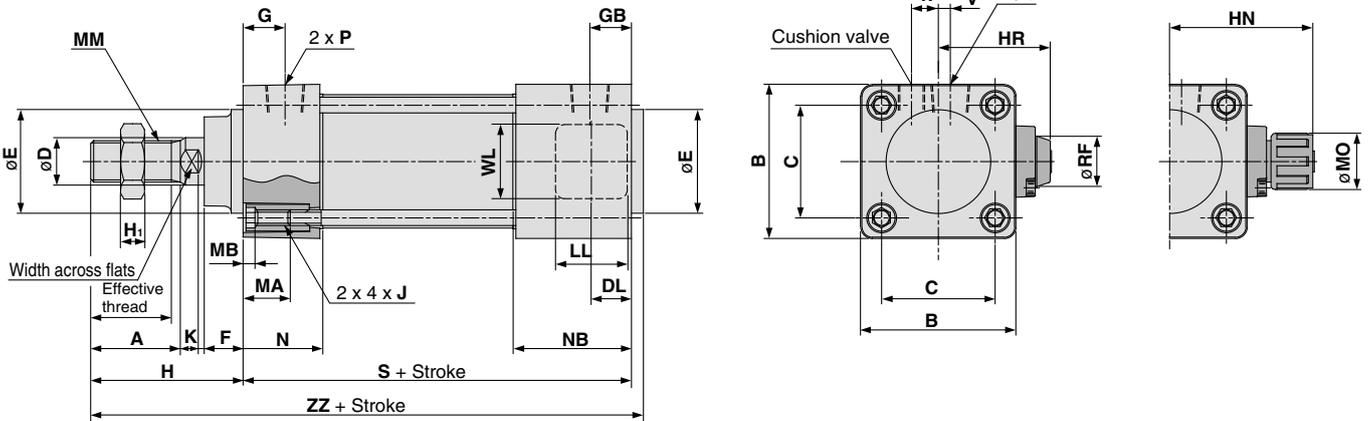
- D-
- X
- Individual
- X
- Technical data

Series MBB

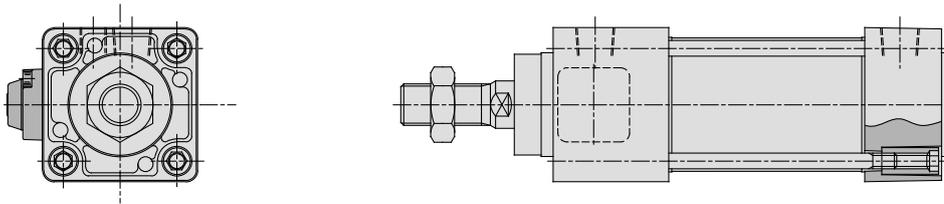
Basic: (B)

Locking at head end: MBBB — — H□

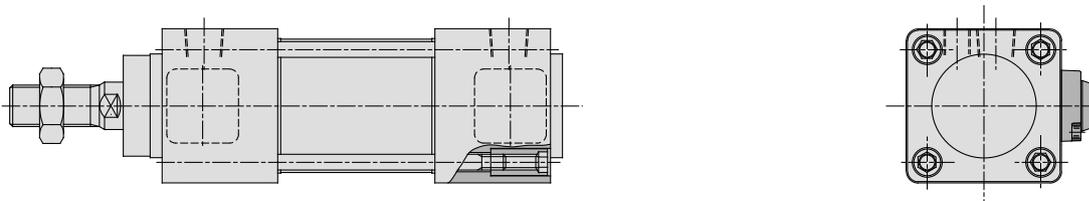
Manual release non-locking type: N Manual release locking type: L



Locking at rod end: MBBB — — R□



Locking at both ends: MBBB — — W□



-H□/-R□

(mm)

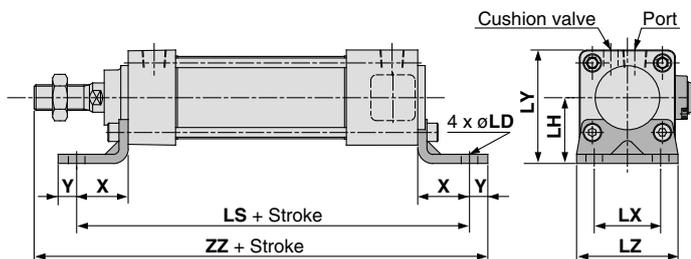
Bore size (mm)	Stroke range (mm)	Effective thread length	Width across flats	A	B	C	D	DL	E	F	G	GB	H ₁	H	HR	HN	J	K	LL	MA	MB
32	to 500	19.5	10	22	46	32.5	12	9	30	13	13	21	6	47	33.5	45	M6 x 1	6	15	16	4
40	to 500	27	14	30	52	38	16	12	35	13	14	27	8	51	38.5	52.5	M6 x 1	6	21	16	4
50	to 600	32	18	35	65	46.5	20	13	40	14	15.5	27.5	11	58	45	59	M8 x 1.25	7	21	16	5
63	to 600	32	18	35	75	56.5	20	13	45	14	16.5	28.5	11	58	50	64	M8 x 1.25	7	21	16	5
80	to 800	37	22	40	95	72	25	16	45	20	19	37	13	72	62	76.5	M10 x 1.5	10	30	16	5
100	to 800	37	26	40	114	89	30	16	55	20	19	37	16	72	71.5	86	M10 x 1.5	10	30	16	5

-W□

Bore size (mm)	Stroke range (mm)	MM	MO	N	NB	P	RF	S	V	W	WL	ZZ	S	ZZ
32	to 500	M10 x 1.25	15	27	35	1/8	11	92	4	6.5	24	143	100	151
40	to 500	M14 x 1.5	19	27	40	1/4	11	97	4	9	24	152	110	165
50	to 600	M18 x 1.5	19	31.5	43.5	1/4	11	106	5	10.5	24	168	118	180
63	to 600	M18 x 1.5	19	31.5	43.5	3/8	11	106	9	12	24	168	118	180
80	to 800	M22 x 1.5	23	38	56	3/8	21	132	11.5	14	40	208	150	226
100	to 800	M26 x 1.5	23	38	56	1/2	21	132	17	15	40	208	150	226

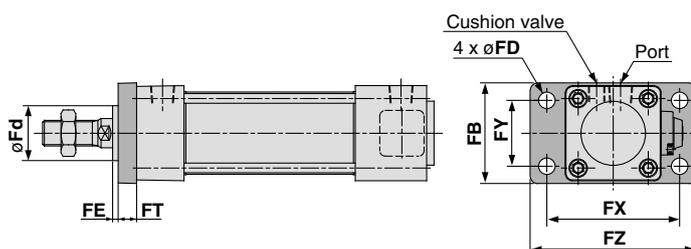
With Mounting Bracket

Foot(L)/Locking at head end (-H□)



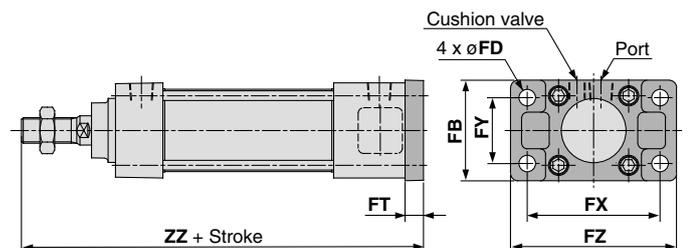
-H□ / -R□		(mm)											-W□	
Bore size (mm)	Stroke range	X	Y	LD	LH	LS	LT	LX	LY	LZ	ZZ	LS	ZZ	
32	to 700	22	9	7	30	136	3.2	32	53	50	170	144	178	
40	to 800	24	11	9	33	145	3.2	38	59	55	183	158	196	
50	to 1000	27	11	9	40	160	3.2	46	72.5	70	202	172	214	
63	to 1000	27	14	12	45	160	3.6	56	82.5	80	205	172	217	
80	to 1000	30	14	12	55	192	4.5	72	102.5	100	248	210	266	
100	to 1000	32	16	14	65	196	4.5	89	122	120	252	214	270	

Front flange(F)/Locking at head end (-H□)



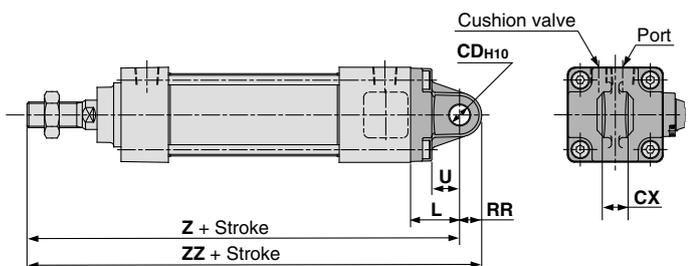
-H□ / -R□ / -W□		(mm)							
Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd
32	to 700	50	7	3	10	64	32	79	25
40	to 800	55	9	3	10	72	36	90	31
50	to 1000	70	9	2	12	90	45	110	38.5
63	to 1000	80	9	2	12	100	50	120	39.5
80	to 1000	100	12	4	16	126	63	153	45
100	to 1000	120	14	4	16	150	75	178	54

Rear flange(G)/Locking at head end (-H□)



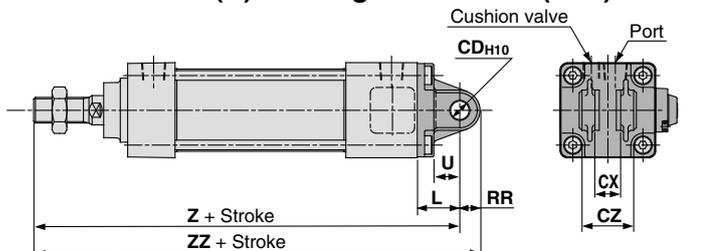
-H□ / -R□		(mm)							-W□
Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ	
32	to 500	50	7	10	64	32	79	149	157
40	to 500	55	9	10	72	36	90	158	171
50	to 600	70	9	12	90	45	110	176	188
63	to 600	80	9	12	100	50	120	176	188
80	to 800	100	12	16	126	63	153	220	238
100	to 800	120	14	16	150	75	178	220	238

Single clevis(C)/Locking at head end (-H□)



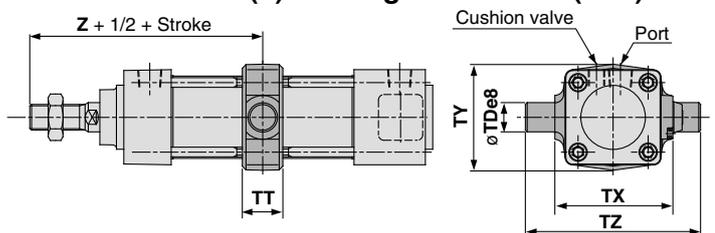
-H□ / -R□		(mm)							-W□	
Bore size (mm)	Stroke range	L	RR	U	CDH10	CX ^{0.1} _{0.3}	Z	ZZ	Z	ZZ
32	to 500	23	10.5	13	10	14	162	172.5	170	180.5
40	to 500	23	11	13	10	14	171	182	184	195
50	to 600	30	15	17	14	20	194	209	206	221
63	to 600	30	15	17	14	20	194	209	206	221
80	to 800	42	23	26	22	30	246	269	264	287
100	to 800	42	23	26	22	30	246	269	264	287

Double clevis(D)/Locking at head end (-H□)



-H□ / -R□		(mm)							-W□		
Bore size (mm)	Stroke range	L	RR	U	CDH10	CX ^{0.3} _{0.1}	CZ	Z	ZZ	Z	ZZ
32	to 500	23	10.5	13	10	14	28	162	172.5	170	180.5
40	to 500	23	11	13	10	14	28	171	182	184	195
50	to 600	30	15	17	14	20	40	194	209	206	221
63	to 600	30	15	17	14	20	40	194	209	206	221
80	to 800	42	23	26	22	30	60	246	269	264	287
100	to 800	42	23	26	22	30	60	246	269	264	287

Center trunnion(T)/Locking at head end (-H□)



-H□		(mm)						-R□ / -W□
Bore size (mm)	Stroke range	TDø8	TT	TX	TY	TZ	Z	Z
32	to 500	12	17	50	49	74	89	97
40	to 500	16	22	63	58	95	93	106
50	to 600	16	22	75	71	107	105	117
63	to 600	20	28	90	87	130	105	117
80	to 800	20	34	110	110	150	129	147
100	to 800	25	40	132	136	182	129	147

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

-X□

Technical

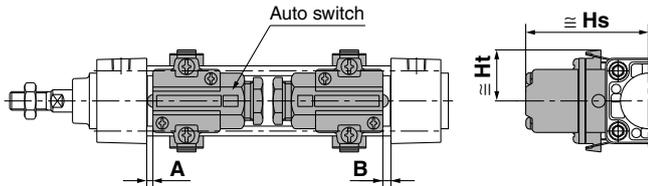
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Series MB

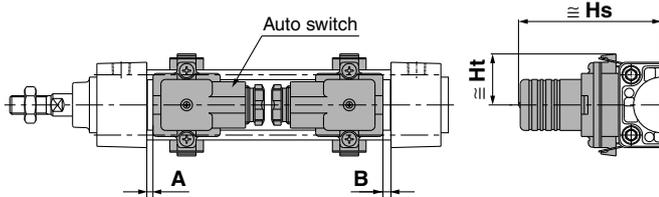
Proper Auto Switch Mounting Position (Detection at stroke end) and Mounting Height

Band mounting

D-A3□/G39/K39



D-A44



Tie-rod mounting

D-A9□/A9□V

D-M9□/M9□V

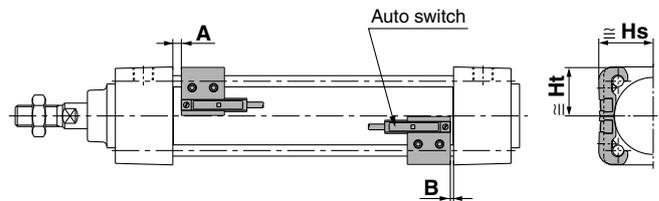
D-M9□W/M9□WV

D-M9□AL/M9□AVL

D-Z7□/Z80

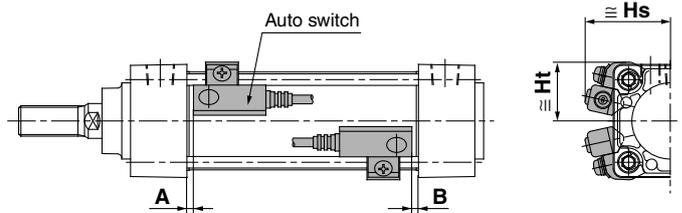
D-Y59□/Y69□/Y7P/Y7PV

D-Y7□W/Y7□WV/Y7BAL



D-A5□/A6□

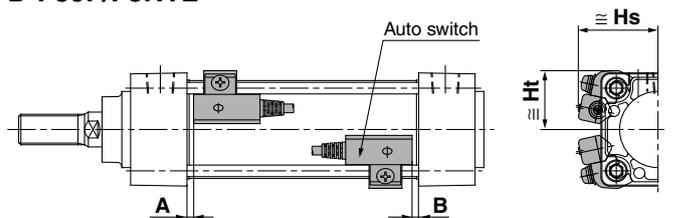
D-A59W



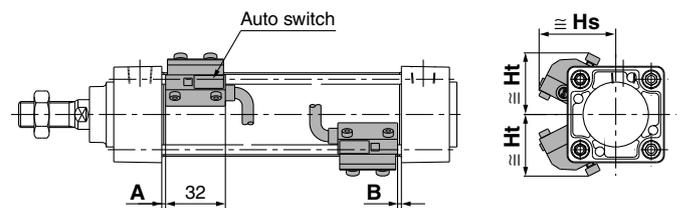
D-F5□/J5□

D-F5□W/J59W/F5BAL

D-F59F/F5NTL



D-P4DWL



Proper Auto Switch Mounting Position (Detection at stroke end) and Mounting Height

Proper Auto Switch Mounting Position

(mm)

Auto switch model	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-A5□ D-A6□		D-A59W		D-F5□W D-J59W D-F5□ D-J5□ D-F5BAL D-F59F		D-F5NTL		D-A3□ D-A44 D-G39 D-K39		D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BAL		D-P4DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
40	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
50	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
63	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
80	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5
100	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5
125	12	12	16	16	6	6	10	10	12.5	12.5	17.5	17.5	6	6	9.5	9.5	9	9

* Cylinders without an air cushion have different dimensions for proper auto switch mounting positions (A and B). Add the following values to both A and B: 3 mm (ø 32 and 40), 4 mm (ø50 and 63), 5 mm (ø80 and 100), 6 mm (ø125).

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Proper Auto Switch Mounting Height

(mm)

Auto switch model	D-A9□ D-M9□ D-M9□W D-M9□AL		D-A9□V		D-M9□V D-M9□WV D-M9□AVL		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F59F D-F5□W D-J59W D-F5BAL D-F5NTL		D-A3□ D-G39 D-K39		D-A44		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W D-Y7BAL		D-Y69□ D-Y7PV D-Y7□WV		D-P4DWL	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	27.5	23	30.5	23	35	24.5	32.5	25	67	27.5	77	27.5	25.5	23	26.5	23	38	31
40	28.5	25.5	31.5	25.5	34	25.5	38.5	27.5	36.5	27.5	71.5	27.5	81.5	27.5	29.5	26	30	26	42	33
50	33.5	31	36	31	38.5	31	43.5	34.5	41	34	77	—	87	—	33.5	31	34.5	31	46.5	39
63	38.5	36	40.5	36	43	36	48.5	39.5	46	39	83.5	—	93.5	—	39	36	40	36	51.5	44
80	46.5	45	49	45	52	45	55	46.5	52.5	46.5	92.5	—	103	—	47.5	45	48.5	45	58	51.5
100	54	53.5	57	53.5	59.5	53.5	62	55	59.5	55	103	—	113.5	—	55.5	53.5	56.5	53.5	65.5	60.5
125	65.5	64.5	68.5	64.5	71	64.5	71.5	66.5	70.5	66.5	115	—	125	—	67.5	65	68.5	65	76.5	72

Operating Range

(mm)

Auto switch model	Bore size							
	32	40	50	63	80	100	125	
D-A9□/A9□V	7	7.5	8.5	9.5	9.5	10.5	12	
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	4	4.5	5	6	6	6	7	
D-Z7□/Z80	7.5	8.5	7.5	9.5	9.5	10.5	13	
D-A5□/A6□	9	9	10	11	11	11	10	
D-A59W	13	13	13	14	14	15	17	
D-A3□/A44	9	9	10	11	11	11	10	
D-Y59□/Y69□ D-Y7P/Y7□V D-Y7□W/Y7□WV D-Y7BAL	5.5	5.5	7	7.5	6.5	5.5	7	
D-F5□/J5□ D-F5□W/J59W D-F5BAL/F5NTL D-F59F	3.5	4	4	4.5	4.5	4.5	5	
D-G39/K39	9	9	9	10	10	11	11	
D-P4DWL	4	4	4	4.5	4	4.5	4.5	

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

Technical
data

Minimum Auto Switch Mounting Stroke: Mounting Brackets Except Center Trunnion Type

Auto switch model	No. of auto switches	Mounting brackets except center trunnion type		
		ø32, ø40, ø50, ø63	ø80, ø100	ø125
D-A9□	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-A9□V	2 (Different surfaces, same surface) 1	10		
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-M9□ D-M9□W	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-M9□V D-M9□WV	2 (Different surfaces, same surface) 1	10		
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-M9□AL	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-M9□AVL	2 (Different surfaces, same surface) 1	15		
	n	$15 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-A3□ D-G39 D-K39	2 (Different surfaces)	35		
	2 (Same surface)	100		
	n (Different surfaces)	$35 + 30 (n - 2)$ (n = 2, 3, 4...)		
	n (Same surface)	$100 + 100 (n - 2)$ (n = 2, 3, 4...)		
	1	10		
D-A44	2 (Different surfaces)	35		
	2 (Same surface)	55		
	n (Different surfaces)	$35 + 30 (n - 2)$ (n = 2, 3, 4...)		
	n (Same surface)	$55 + 50 (n - 2)$ (n = 2, 3, 4...)		
	1	10		
D-A5□ D-A6□	2 (Different surfaces, same surface) 1	15	20	20
	n (Same surface)	$15 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$20 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$20 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)
D-A59W	2 (Different surfaces, same surface)	20	25	25
	n (Same surface)	$20 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)
	1	15	25	25
D-F5□ D-J5□ D-F5□W D-J59W D-F5BAL D-F59F	2 (Different surfaces, same surface)	15	25	25
	n (Same surface)	$15 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)
	1	10	25	25
D-F5NTL	2 (Different surfaces, same surface)	15	25	30
	n (Same surface)	$15 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$30 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)
	1	10	25	30
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		

Minimum Auto Switch Mounting Stroke: Mounting Brackets Except Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Mounting brackets except center trunnion type		
		ø32, ø40, ø50, ø63	ø80, ø100	ø125
D-Y69 □ D-Y7PV D-Y7 □ WV	2 (Different surfaces, same surface) 1	10		
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-Y7BAL	2 (Different surfaces, same surface) 1	20		
	n	$20 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)		
D-P4DWL	2 (Different surfaces, same surface) 1	15	20	
	n	$15 + 65 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$20 + 65 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

Technical
data

Minimum Auto Switch Mounting Stroke: Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Center trunnion						
		ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□	2 (Different surfaces, same surface) 1	70	75		80	85	95	100
	n	$70 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$75 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$80 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$100 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-A9□V	2 (Different surfaces, same surface) 1	45	50		55	60	70	75
	n	$45 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$50 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$55 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$60 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$70 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$75 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□ D-M9□W	2 (Different surfaces, same surface) 1	75	80		85	90	95	105
	n	$75 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$80 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$85 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$90 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□V D-M9□WV	2 (Different surfaces, same surface) 1	50	55		60	65	70	80
	n	$50 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$55 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$60 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$65 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$70 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$80 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□AL	2 (Different surfaces, same surface) 1	80	85		90	95	100	110
	n	$80 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$90 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$100 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□AVL	2 (Different surfaces, same surface) 1	55	60		65	70	75	85
	n	$55 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$60 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$65 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$70 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$75 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-A3□ D-G39 D-K39	2 (Different surfaces)	60	65		75	80	85	90
	2 (Same surface)	90	95		100	105	110	125
	n (Different surfaces)	$60 + 30(n-2)$ (n = 2, 4, 6, 8...)	$65 + 30(n-2)$ (n = 2, 4, 6, 8...)		$75 + 30(n-2)$ (n = 2, 4, 6, 8...)	$80 + 30(n-2)$ (n = 2, 4, 6, 8...)	$85 + 30(n-2)$ (n = 2, 4, 6, 8...)	$90 + 30(n-2)$ (n = 2, 4, 6, 8...)
	n (Same surface)	$90 + 100(n-2)$ (n = 2, 4, 6, 8...)	$95 + 100(n-2)$ (n = 2, 4, 6, 8...)		$100 + 100(n-2)$ (n = 2, 4, 6, 8...)	$105 + 100(n-2)$ (n = 2, 4, 6, 8...)	$110 + 100(n-2)$ (n = 2, 4, 6, 8...)	$125 + 100(n-2)$ (n = 2, 4, 6, 8...)
	1	60	65		75	80	85	90
D-A44	2 (Different surfaces)	70	75		80		85	90
	2 (Same surface)							
	n (Different surfaces)	$70 + 30(n-2)$ (n = 2, 4, 6, 8...)	$75 + 30(n-2)$ (n = 2, 4, 6, 8...)		$80 + 30(n-2)$ (n = 2, 4, 6, 8...)		$85 + 30(n-2)$ (n = 2, 4, 6, 8...)	$90 + 30(n-2)$ (n = 2, 4, 6, 8...)
	n (Same surface)	$70 + 50(n-2)$ (n = 2, 4, 6, 8...)	$75 + 50(n-2)$ (n = 2, 4, 6, 8...)		$80 + 50(n-2)$ (n = 2, 4, 6, 8...)		$85 + 50(n-2)$ (n = 2, 4, 6, 8...)	$90 + 50(n-2)$ (n = 2, 4, 6, 8...)
	1	70	75		80		85	90
D-A5□ D-A6□	2 (Different surfaces, same surface) 1	60		80	105	110	115	
	n (Same surface)	$60 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$80 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	
D-A59W	2 (Different surfaces, same surface)	60	70	85	110	115	120	
	n (Same surface)	$60 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$70 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$120 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	
	1	60	70	85	110	115	120	
D-F5□/J5□ D-F5□W D-J59W D-F5BAL D-F59F	2 (Different surfaces, same surface)	90	95		110	115	120	130
	n (Same surface)	$90 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$110 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$120 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$130 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
	1	90	95		110	115	120	130
D-F5NTL	2 (Different surfaces, same surface)	100	105		120	125	130	140
	n (Same surface)	$100 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$120 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$125 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$130 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$140 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
	1	100	105		120	125	130	140
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, same surface) 1	80	85	90		95	100	105
	n	$80 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$90 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$95 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$100 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, same surface) 1	60	65		70	75	85	85
	n	$60 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$65 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$70 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$75 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)

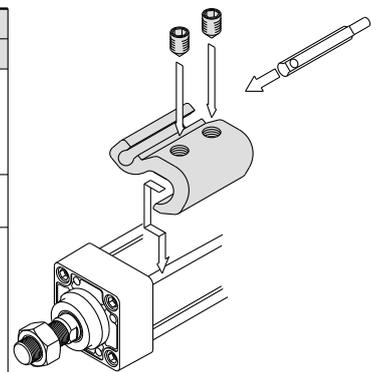
Minimum Auto Switch Mounting Stroke: Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Center trunnion						
		ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-Y7BAL	2 (Different surfaces, same surface) 1	85	90		100	105	110	115
	n	$85 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$90 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$100 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-P4DWL	2 (Different surfaces, same surface) 1	120		130		140		150
	n	$120 + 65 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$130 + 65 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$140 + 65 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)		$150 + 65 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)

Auto Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)						
	ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063	BA7-080
D-A3□/A44 D-G39/K39	BMB2-032	BMB2-040	BMB1-050	BMB1-063	BMB1-080	BMB1-100	BS1-125
D-A5□/A6□ D-A59W D-F5□/J5□ D-F5□W/J59W D-F59F D-F5BAL D-F5NTL	BT-03	BT-03	BT-05	BT-05	BT-06	BT-06	BT-08
D-P4DWL	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080	BAP2T-080
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BAL	BMB4-032	BMB4-032	BMB4-050	BMB4-050	BA4-063	BA4-063	BA4-080



The figure shows the mounting example for D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V)L.

[Stainless Steel Mounting Screw Kit]

The following set of stainless steel mounting screws (including set screws) is available. Use them in accordance with the operating environment. (Since auto switch brackets are not included, order them separately.)

BBA1: For D-A5/A6/F5/J5 types

Note 1) Refer to page 1365 for the details of BBA1.

The above stainless steel screws are used when a cylinder is shipped with D-F5BAL type auto switches.

When only a switch is shipped independently, BBA1 is attached.

Note 2) When using D-M9□A(V)L/Y7BAL, do not use the steel set screws which is included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 6L stainless steel set screws included in the BBA1.

In addition to the auto switches listed above, the following auto switches are also available. Refer to pages 1263 to 1371 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Entry direction)	Features
Reed auto switch	D-A93V, A96V	Grommet (perpendicular)	—
	D-A90V		Without indicator light
	D-A53, A56, Z73, Z76	Grommet (in-line)	—
	D-A67, Z80		Without indicator light
Solid state auto switch	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-Y69A, Y69B, Y7PV		—
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color)
	D-Y7NWW, Y7PWV, Y7BWV		Water resistant (2-color indication)
	D-M9NAVL, M9PAVL, M9BAVL	Grommet (in-line)	—
	D-F59, F5P, J59		—
	D-Y59A, Y59B, Y7P		—
	D-F59W, F5PW, J59W		Diagnostic indication (2-color)
	D-Y7NW, Y7PW, Y7BW		Water resistant (2-color indication)
	D-F5BAL, Y7BAL		With timer
	D-F5NTL		Magnetic field resistant (2-color indication)
D-P5DWL			

* For solid state switches, auto switches with a pre-wired connector are also available. Refer to pages 1328 and 1329 for details.

* Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H/Y7G/Y7H types) are also available. Refer to page 1290 and 1292 for details.

- CJ1**
- CJP**
- CJ2**
- CM2**
- CG1**
- MB**
- MB1**
- CA2**
- CS1**
- CS2**

- D-□**
- X□**
- Individual
-X□
- Technical
data



Series MB Specific Product Precautions

Be sure to read before handling.

Refer to front matters 54 and 55 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Adjustment

Warning

1. Do not open the cushion valve beyond the stopper.

Crimping ($\phi 32$) or a snap ring ($\phi 40$ to $\phi 100$) is provided to prevent the accidental removal of the cushion valve. Do not open the valve beyond the mechanism. If air is supplied, the cushion valve may shoot out from the cover.

Bore (mm)	Cushion valve width across flats	Socket wrench
32, 40	2.5	JIS 4648 Hexagonal spanner wrench 2.5
50, 63	3	JIS 4648 Hexagonal spanner wrench 3
80, 100	4	JIS 4648 Hexagonal spanner wrench 4
125	4	JIS 4648 Hexagonal spanner wrench 4

2. Use the air cushion at the end of cylinder stroke.

Select the cylinder with bumper "N" if cushion valve is to be fully opened.

Tie rods or piston assembly may be damaged if neither air cushion nor bumper is utilized.

3. When replacing mounting bracket, use a socket wrench.

Bore (mm)		Bolt	Width across flats	Tightening torque (N·m)
32, 40		MB-32-48-C1247	4	5.1
50, 63		MB-50-48-C1249	5	11
80, 100	Foot	MB-80-48AC1251	6	25
	Other	MB-80-48BC1251		
125	Foot	M12 x 1.75 x 25 (brazier head cap screw)	8	30.1
	Other	M12 x 1.75 x 28 (brazier head cap screw)		

4. When replacing a bracket, tie-rod nuts on the cylinder body become loosened.

After retightening the tie-rod nuts with the proper tightening torque (Refer to Adjustment 3.), mount a mounting bracket.

5. There is no mounting interchangeability with serise CA1.

6. Mounting precision is required for the trunnion type cylinder.

It is difficult to align the axial center of the trunnion with the axial center of the cylinder. Thus, if this type of cylinder is disassembled and reassembled, the required dimensional accuracy cannot be attained, which may lead to malfunctions.

Non-rotating rod (Double acting, Single rod)

Handling

Caution

1. Avoid using the air cylinder in such a way that more than allowable rotational torque would be applied to the piston rod.

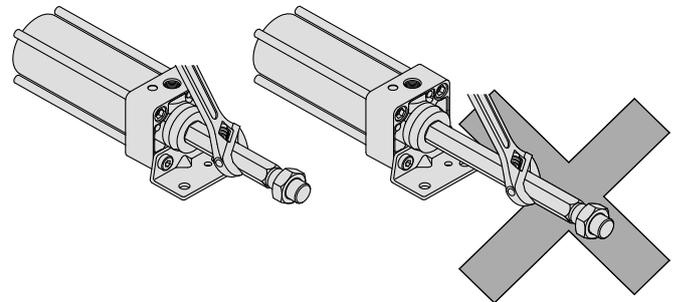
If rotational torque is applied, the non-rotating guide will deform, thus affecting the non-rotating accuracy. valve may shoot out from the cover.

Mounting and Piping

Caution

1. Mounting a workpiece on the rod end

To screw a bracket or a nut onto the threaded portion at the tip of the piston rod, make sure to retract the piston rod entirely, and place a wrench over the flat portion of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.



Combinations of Standard Products and Made

Series MB1

● : Standard
◎ : Made to Order specifications
○ : Special product (Contact SMC for details.)
— : Not available

Symbol	Specification	Applicable bore size	Series MB1 (Standard)			
			Action/Type			
			Cushion			
			Air		Rubber	
		ø32 to ø100	ø125	ø32 to ø100	ø125	
Standard	Standard	ø32 to ø125	●	●	●	●
Long st	Long stroke		○	○	○	○
D	Built-in magnet		●	●	●	●
MB1□-□ ^J _K	With rod boot		●	●	●	●
10-	Clean series		●	○	●	○
20-	Copper and Fluorine-free		●	○	●	○
MB1□ ^R _V	Water resistant		●	○	●	○
XA□	Change of rod end shape		ø32 to ø125	◎	◎	◎
XB5	Oversized rod cylinder	◎		○	○	○
XB6	Heat-resistant cylinder (-10 to 150°C)	◎		○	○	○
XB13	Low-speed cylinder (5 to 50 mm/s)	○		○	○	○
XC3	Special port position	◎		○	◎	○
XC4	With heavy duty scraper	◎		○	◎	○
XC5	Heat-resistant cylinder (-10 to 110°C)	◎		○	○	○
XC6	Made of stainless steel	◎		◎	◎	◎
XC7	Tie-rod, cushion valve, tie-rod nut, etc. made of stainless steel	◎		○	◎	○
XC8	Adjustable stroke cylinder/Adjustable extension type	◎		○	◎	○
XC9	Adjustable stroke cylinder/Adjustable retraction type	◎		○	◎	○
XC10	Dual stroke cylinder/Double rod type	◎		○	◎	○
XC11	Dual stroke cylinder/Single rod type	◎		○	◎	○
XC12	Tandem cylinder	◎		○	◎	○
XC22	Fluororubber seal	◎		○	◎	○
XC27	Double clevis pins made of Stainless steel (Stainless steel 304)	◎		◎	◎	◎
XC29	Double knuckle joint with spring pin	◎		○	◎	○
XC30	Rod side trunnion	◎ Note 1)		○	◎ Note 1)	○
XC35	With coil scraper	◎		○	◎	○
XC59	Fluororubber seal, Built-in hard plastic magnet	◎		○	◎	○
XC65	XC6 + XC7 specifications	◎		○	◎	○
X846	Fastener strips mounted on switch mounting grooves	◎		◎	◎	◎

Note 1) For Series MB1, a T bracket can be used only when selecting XC30.

Note 2) XC10 specification for Series MBK is the non-rotating type on both sides. For only one side, submit a special order request form.

to Order Specifications

Series **MB1**

MB1 (Standard)				MB1K (Non-rotating)			
Double acting							
Double rod				Single rod		Double rod	
Air		Rubber		Air	Rubber	Air	Rubber
ø32 to ø100	ø125	ø32 to ø100	ø125	ø32 to ø100			
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- CJ1**
- CJP**
- CJ2**
- CM2**
- CG1**
- MB**
- MB1**
- CA2**
- CS1**
- CS2**

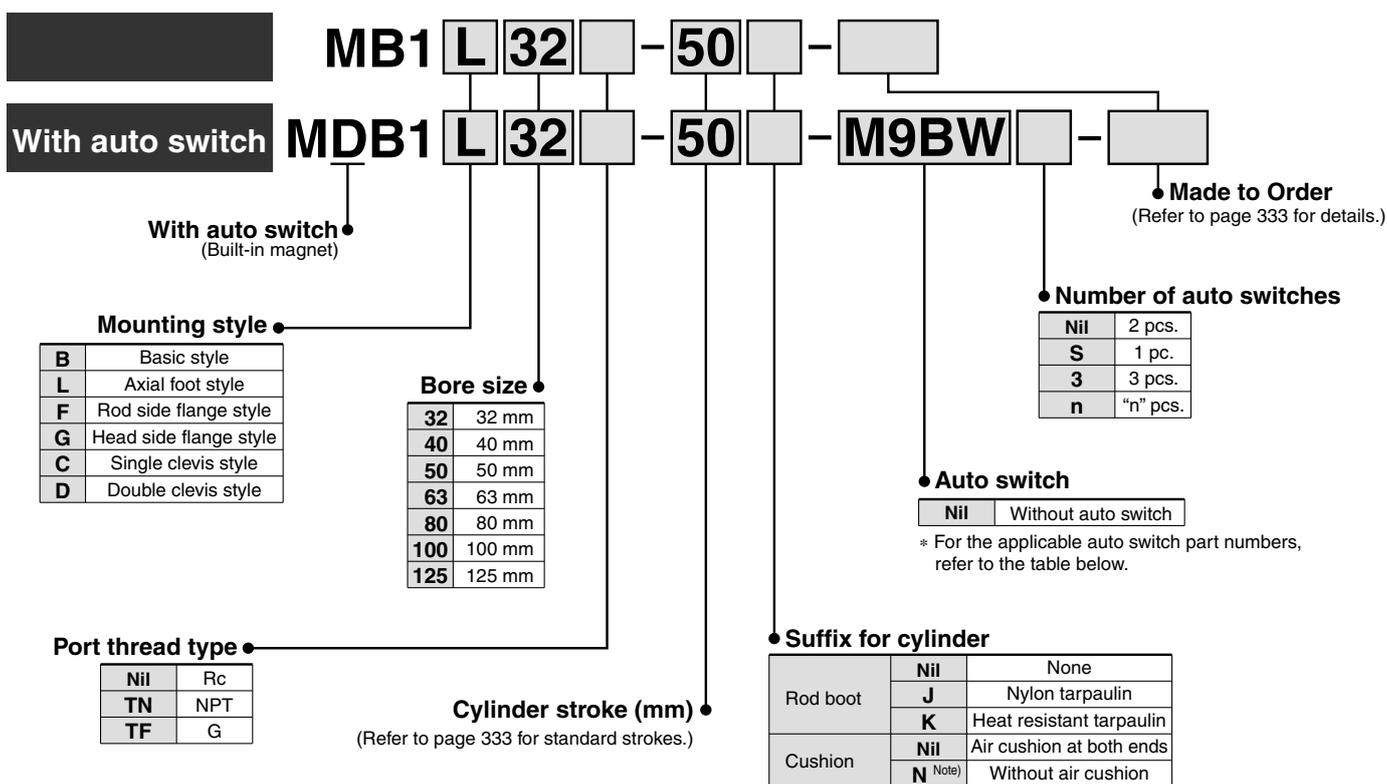
- D-□**
- X□**
- Individual
-X□
- Technical
data

Square Tube Type Air Cylinder: Standard Type Double Acting, Single Rod

Series MB1

ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order



Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.

(Example) MDB1F40-100

Note) In the case of w/o air cushion, it comes with rubber bumper.

Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load			
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC		
Solid state switch	—	Grommet	No	3-wire (NPN)	24V	5V, 12V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)				M9PV	M9P	●	●	●	○				
				2-wire				M9BV	M9B	●	●	●	○				
	Diagnostic indication (2-color indication)		Yes	3-wire (NPN)	M9NWV	M9NW	●	●	●	○	○	IC circuit					
				3-wire (PNP)	M9P WV	M9PW	●	●	●	○	—						
				2-wire	M9B WV	M9BW	●	●	●	○							
	Water resistant (2-color indication)	No	3-wire (NPN)	24V	5V, 12V	M9NAV	M9NA	○	○	●	○	IC circuit					
			3-wire (PNP)			M9PAV	M9PA	○	○	●	○						
			2-wire			M9BAV	M9BA	○	○	●	○						
Reed switch	—	Grommet	No	3-wire (NPN equivalent)	24V	5V	—	A96V	A96	●	—	●	—	IC circuit	—		
				2-wire				100V	A93V	A93	●	—	●			—	—
									100V or less	A90V	A90	●	—			●	

* Lead wire length symbols: 0.5 m Nil (Example) M9NV
 1 m M (Example) M9NWM
 3 m L (Example) M9NWL
 5 m Z (Example) M9NWX

* Solid state auto switches marked with "○" are produced upon receipt of order.

* Since there are other applicable auto switches than listed above, refer to page 350 for details.

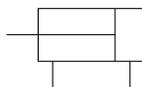
* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.

* Auto switches are shipped together (not assembled).

Square Tube Type Air Cylinder: Standard Type *Series MB1*



JIS Symbol
Double acting



Made to Order Specifications

(For details, refer to pages 1373 to 1498 and 1514.)

Symbol	Specifications
—XA□	Change of rod end shape
—XB5	Oversized rod cylinder
—XB6	Heat resistant cylinder (150°C)
—XC3	Special port location
—XC4	With heavy duty scraper
—XC5	Heat resistant cylinder (110°C)
—XC6	Piston rod and rod end nut made of stainless steel
—XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
—XC8	Adjustable stroke cylinder/Adjustable extension type
—XC9	Adjustable stroke cylinder/Adjustable retraction type
—XC10	Dual stroke cylinder/Double rod type
—XC11	Dual stroke cylinder/Single rod type
—XC12	Tandem type cylinder
—XC22	Fluororubber seals
—XC27	Double clevis pin and double knuckle pin made of stainless steel
—XC29	Double knuckle joint with spring pin
—XC30	Rod side trunnion
—XC35	With coil scraper
—XC59	Fluororubber seals Built-in hard plastic magnet
—XC65	XC6 + XC7 specifications
—XB46	Fastener strips mounted on switch mounting grooves

Refer to pages 349 and 350 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Maximum operating pressure	1.0 MPa						
Minimum operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch -10 to 70°C (No freezing)						
	With auto switch -10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Piston speed	50 to 1000 mm/s						50 to 700 mm/s
Stroke length tolerance	Up to 250: $^{+1.0}_0$, 251 to 1000: $^{+1.4}_0$, 1001 to 1500: $^{+1.8}_0$						
Cushion	Both ends (Air cushion) ^{Note)}						
Port size (Rc, NPT, G)	1/8	1/4	3/8		1/2		
Mounting	Basic style, Foot style, Rod side flange style, Head side flange style Single clevis style, Double clevis style						

Note) In the case of w/o air cushion, it comes with rubber bumper.

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000	1400

Note) Intermediate strokes are available, too. (Spacer is not used.)

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Head side flange style	Single clevis style	Double clevis style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot ⁽¹⁾	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10	MB-C12
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10	MB-D12

Note 1) Order two foot brackets per cylinder.

Note 2) Accessories for each mounting bracket are as follows. Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, cotter pins and flat washer. Refer to page 339 for details.

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

-X□

Technical data

Series MB1

Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	OUT	804	161	241	322	402	482	563	643	724	804
		IN	691	138	207	276	346	415	484	553	622	691
40	16	OUT	1257	251	377	503	629	754	880	1006	1131	1257
		IN	1056	211	317	422	528	634	739	845	950	1056
50	20	OUT	1963	393	589	785	982	1178	1374	1570	1767	1963
		IN	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	OUT	3117	623	935	1247	1559	1870	2182	2494	2805	3117
		IN	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	OUT	5027	1005	1508	2011	2514	3016	3519	4022	4524	5027
		IN	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	OUT	7854	1571	2356	3142	3927	4712	5498	6283	7069	7854
		IN	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	OUT	12272	2454	3682	4909	6136	7363	8590	9818	11045	12272
		IN	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

(Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

Mass

(kg)

Bore size (mm)		32	40	50	63	80	100	125
Basic mass	Basic style	0.53	0.72	1.24	1.54	2.84	3.83	5.68
	Foot style	0.65	0.86	1.46	1.82	3.34	4.49	7.76
	Flange style	0.82	1.09	1.69	2.33	4.29	7.14	9.84
	Single clevis style	0.78	0.95	1.58	2.17	3.95	7.0	8.25
	Double clevis style	0.79	0.99	1.67	2.33	4.24	7.52	8.45
Additional mass per each 50 mm of stroke	All mounting brackets	0.16	0.21	0.33	0.37	0.56	0.72	0.94
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation:

(Example) **MB1B32-100** (Basic style/ø32, 100 st)

- Basic mass.....0.53 (Basic style, ø32)
- Additional mass.....0.16/50 mm stroke
- Cylinder stroke.....100 mm stroke

$$0.53 + 0.16 \times 100/50 = 0.85 \text{ kg}$$

Consideration of the Cushion

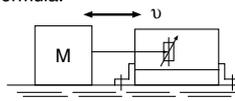
For details about the kinetic energy absorbable by the cushion mechanism and w/ air cushion, refer to page 1571.

Kinetic Energy Absorbable by the Cushion Mechanism

Bore size (mm)	Effective cushion length (mm)	Kinetic energy absorbable (J)
32	18.8	2.2
40	18.8	3.4
50	21.3	5.9
63	21.3	11
80	30.3	20
100	29.3	29
125	Rod side 31.4 Head side 29.4	43

With Air Cushion

At the stroke end, when stopping a large amount of kinetic energy generated by a large load and high speed operation, compression of air is used to absorb the impact without transmitting vibration to the surroundings. The purpose of an air cushion is not to reduce the speed of a piston as it nears the stroke end. The kinetic energy of load can be found using the following formula.



$$E_k = \frac{M}{2} v^2$$

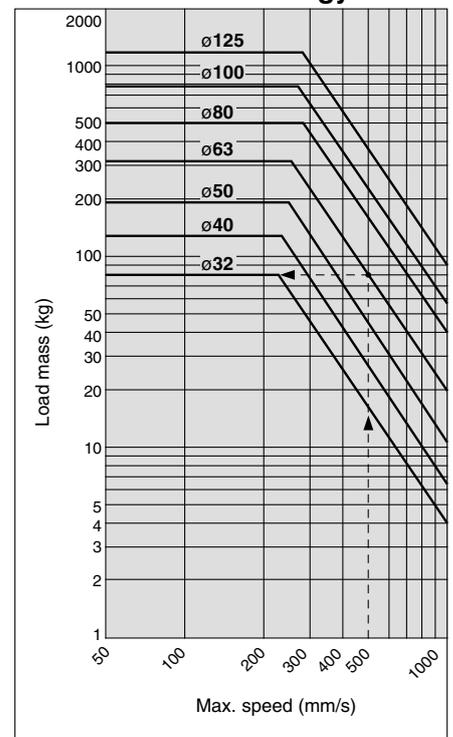
E_k : Kinetic energy (J)

M : Mass of load (kg)

v : Piston speed (m/s)

If the kinetic energy obtained is no greater than the absorbable kinetic energy shown in the table above, the life of the cushion seal will be 10 million cycles or more.

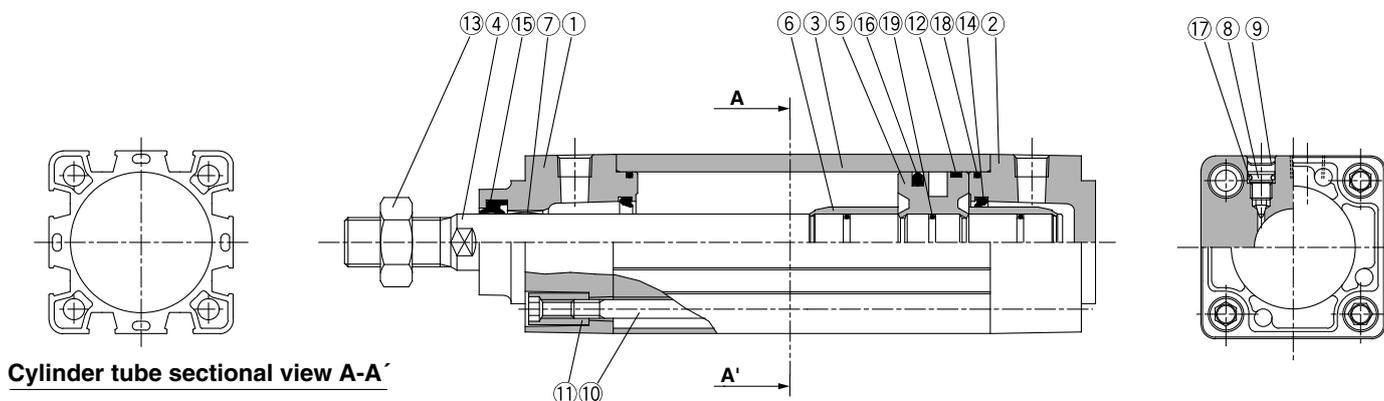
Allowable Kinetic Energy



Example) Load limit at rod end when the air cylinder ø63 is actuated with max. speed of 500 mm/s.

Extend upward from 500 mm/s on the horizontal axis of the graph to the intersection point with the line for a tube bore of 63 mm, and then extend leftward from this point to find the load of 80 kg.

Construction



Cylinder tube sectional view A-A'

Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-casted	Metallic painted
2	Head cover	Aluminum die-casted	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Carbon steel	Hard chrome plated
5	Piston	Aluminum alloy	Chromated
6	Cushion ring	Brass	
7	Bushing	Lead-bronze casted	
8	Cushion valve	Steel wire	Nickel plated
9	Retaining ring	Spring steel	ø40 to ø100
10	Tie-rod	Carbon steel	Zinc chromated
11	Tie-rod nut	Carbon steel	Nickel plated
12	Wear ring	Resin	
13	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
14*	Cushion seal	Urethane	
15*	Rod seal	NBR	
16*	Piston seal	NBR	
17	Cushion valve seal	NBR	
18*	Cylinder tube gasket	NBR	
19	Piston gasket	NBR	

Copper/Fluorine-free

20-MB1 Mounting style Bore size Port thread type — Stroke Suffix

• Copper/Fluorine-free

The type which prevents copper based ions from generating by changing the copper based materials into non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the color cathode ray tube.

Replacement Parts/ Seal Kit

Bore size (mm)	Kit no.	Contents
32	MB32 — PS	Set of the above nos. 14, 15, 16, 18
40	MB40 — PS	
50	MB50 — PS	
63	MB63 — PS	
80	MB80 — PS	
100	MB100 — PS	

* Seal kit includes 14 to 16, 18. Order the seal kit, based on each bore size.

* Seal kit includes a grease pack (ø32 to 50 : 10 g, ø63, 80 : 20 g, ø100 : 30g). Order with the following part number when only the grease pack is needed.

Grease pack part number : GR-S-010 (10g), GR-S-020 (20g)

Specifications

Action	Double acting, Single rod
Bore size (mm)	ø32, ø40, ø50, ø63, ø80, ø100
Max. operating pressure	1.0 MPa
Min. operating pressure	0.05 MPa
Cushion	Air cushion*
Piping	Screw-in type
Piston speed	50 to 1000 mm/s
Mounting	Basic style, Axial foot style, Rod side flange style Head side flange style, Single clevis style, Double clevis style, Center trunnion style

* Auto switch can be mounted.

★ Use within the energy absorption. (Refer to page 334.)

* When there is no air cushion, the unit is equipped with rubber bumpers.

Water Resistant Air Cylinders

As compared to the standard cylinder, anti-coolant performance has been improved, and suitable for using under the atmosphere having coolant in the machine tools. Improved water resistant air cylinder, Series MB is also available, which is compliant for the environment having water splashed on the food machinery, or car washing machine, etc. Refer to page 899 for details.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

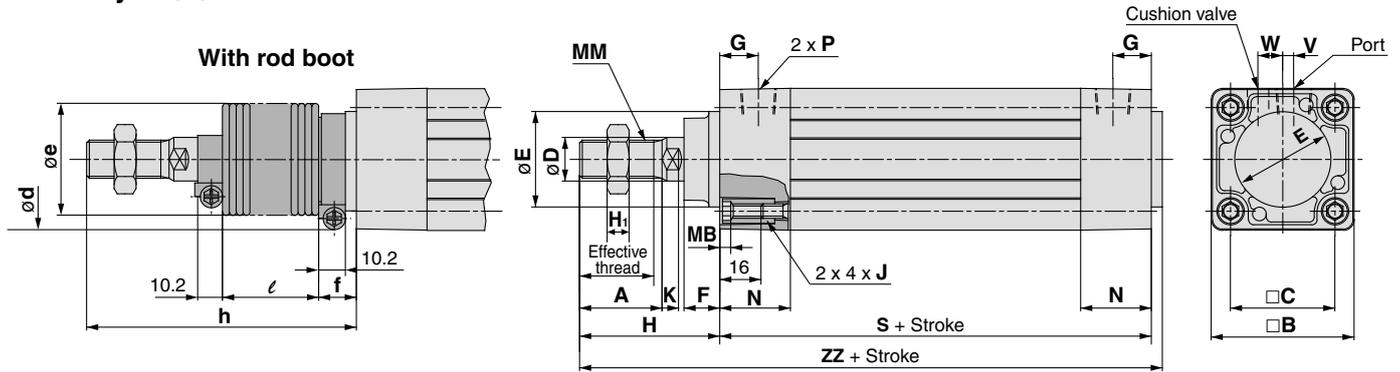
Individual
-X□

Technical
data

Series MB1

Standard Type

Basic style: (B)



Without Air Cushion

Bore size (mm)	S	ZZ	Bore size (mm)	S	ZZ
32	90	141	63	102	164
40	90	145	80	124	200
50	102	164	100	124	200
			125	132	235

* In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Bore size (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H ₁	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*
32	Up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	135
40	Up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	9	139
50	Up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	Up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	156
80	Up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	190
100	Up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	190
125	Up to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2	38	1/2	120	17	15	223

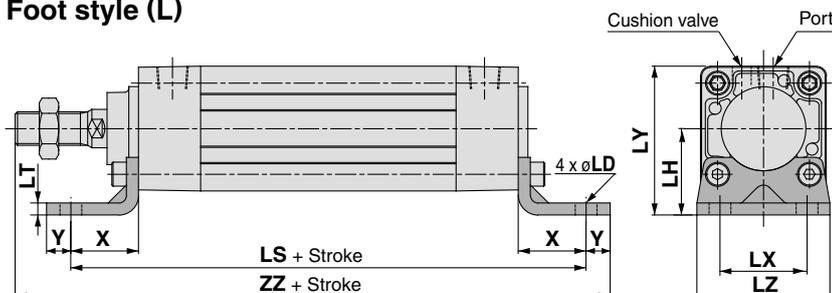
With Rod Boot

Bore size (mm)	d	e	f	ℓ												h																
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000					
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	—	—	—	—	
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	—	—	—	—	
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	—	101	114	126	139	164	189	214	239	264	289	—	—	—	—	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	—	101	114	126	139	164	189	214	239	264	289	—	—	—	—	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	—	120	130	140	150	170	190	210	230	250	270	290	310	—	—	—	—

Standard Type: With Mounting Bracket

* Dimensions not shown are the same as basic style. (drawing above)

Foot style (L)



Without Air Cushion

Bore size (mm)	LS	ZZ
32	134	168
40	138	176
50	156	198
63	156	201
80	184	240
100	188	244
125	222	294

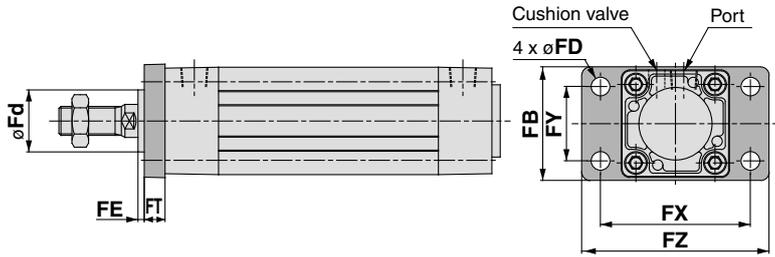
Foot Style

Bore size (mm)	Stroke range	X	Y	LD	LH	LS*	LT	LX	LY	LZ	ZZ*
32	Up to 700	22	9	7	30	128	3.2	32	53	50	162
40	Up to 800	24	11	9	33	132	3.2	38	59	55	170
50	Up to 1000	27	11	9	40	148	3.2	46	72.5	70	190
63	Up to 1000	27	14	12	45	148	3.6	56	82.5	80	193
80	Up to 1000	30	14	12	55	174	4.5	72	102.5	100	230
100	Up to 1000	32	16	14	65	178	4.5	89	122	120	234
125	Up to 1400	45	20	14	81	210	8	90	149	136	282

* In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Standard Type: With Mounting Bracket

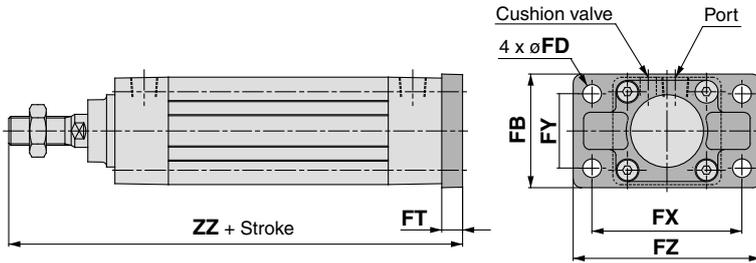
Rod side flange style (F)



Rod Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd
32	Up to 700	50	7	3	10	64	32	79	25
40	Up to 800	55	9	3	10	72	36	90	31
50	Up to 1000	70	9	2	12	90	45	110	38.5
63	Up to 1000	80	9	2	12	100	50	120	39.5
80	Up to 1000	100	12	4	16	126	63	153	45.5
100	Up to 1000	120	14	4	16	150	75	178	54
125	Up to 1400	138	14	7	20	180	102	216	57.5

Head side flange style (G)



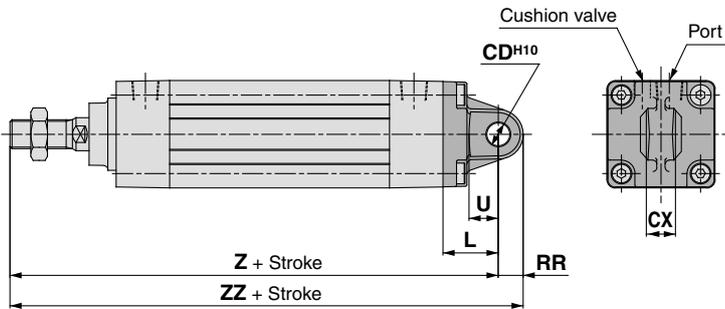
Without Air Cushion

Bore size (mm)	ZZ
32	147
40	151
50, 63	172
80, 100	212
125	249

Head Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ*
32	Up to 500	50	7	10	64	32	79	141
40	Up to 500	55	9	10	72	36	90	145
50	Up to 600	70	9	12	90	45	110	164
63	Up to 600	80	9	12	100	50	120	164
80	Up to 800	100	12	16	126	63	153	202
100	Up to 800	120	14	16	150	75	178	202
125	Up to 1000	138	14	20	180	102	216	237

Single clevis style (C)



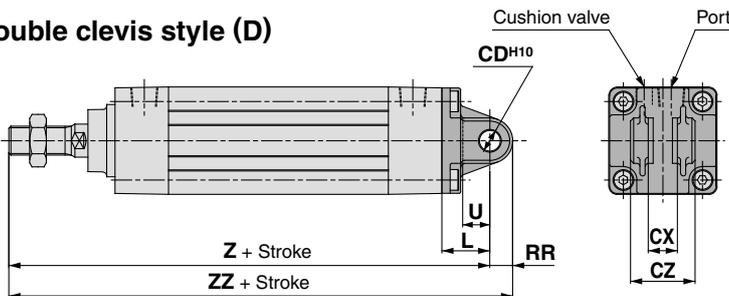
Without Air Cushion

Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Single Clevis Style

Bore size (mm)	Stroke range	L	RR	U	CDH10	CX ^{+0.3} _{-0.1}	Z*	ZZ*
32	Up to 500	23	10.5	13	10	14	154	164.5
40	Up to 500	23	11	13	10	14	158	169
50	Up to 600	30	15	17	14	20	182	197
63	Up to 600	30	15	17	14	20	182	197
80	Up to 800	42	23	26	22	30	228	251
100	Up to 800	42	23	26	22	30	228	251
125	Up to 1000	50	28	30	25	32	267	295

Double clevis style (D)



Overall length of rod/head side flange, single/double clevis, and method for longitudinal mounting

* When there is no air cushion, the unit is equipped with rubber bumpers. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: $\phi 32, \phi 40$: +6 mm, $\phi 50, \phi 63$: +8 mm, $\phi 80, \phi 100$: +10 mm, $\phi 125$: +12 mm.

Without Air Cushion

Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Double Clevis Style

Bore size (mm)	Stroke range	L	RR	U	CDH10	CX ^{+0.3} _{-0.1}	CZ	Z*	ZZ*
32	Up to 500	23	10.5	13	10	14	28	154	164.5
40	Up to 500	23	11	13	10	14	28	158	169
50	Up to 600	30	15	17	14	20	40	182	197
63	Up to 600	30	15	17	14	20	40	182	197
80	Up to 800	42	23	26	22	30	60	228	251
100	Up to 800	42	23	26	22	30	60	228	251
125	Up to 1000	50	28	30	25	32	64	267	295

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual -X□

Technical data

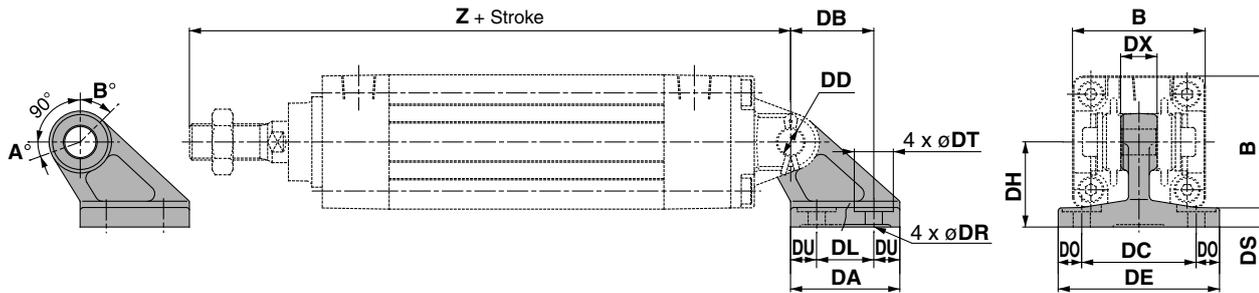
Series MB1

Pivot Bracket/Double Clevis Pivot Bracket

Type

Bore size	MB□32	MB□40	MB□50	MB□63	MB□80	MB□100	MB□125
Description							
Double clevis pivot bracket	MB-B03		MB-B05		MB-B08		MB-B12

Double clevis pivot bracket



Without Air Cushion

(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z*	DD _{H10}
MB-B03	32	46	42	32	22	10	44	14	62	9	6.6	15	7	33	154	10 ^{+0.058} ₀
	40	52	42	32	22	10	44	14	62	9	6.6	15	7	33	158	10 ^{+0.058} ₀
MB-B05	50	65	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 ^{+0.070} ₀
	63	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 ^{+0.070} ₀
MB-B08	80	95	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 ^{+0.084} ₀
	100	114	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 ^{+0.084} ₀
MB-B12	125	136	90	78	60	15	110	32	136	13	13.5	24	14	75	267	25 ^{+0.084} ₀

Bore size (mm)	Z
32	160
40	164
50	190
63	190
80	238
100	238
125	279

Rotating Angle

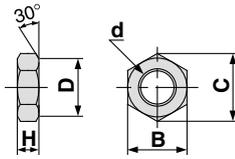
Bore size (mm)	A°	B°	A° + B° + 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°
125	30°	50°	170°

Method for longitudinal mounting of clevis pivot bracket

* In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

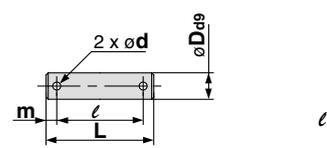
Accessory Bracket Dimensions

Rod end nut
(Standard equipment)



Part no.	Bore size (mm)	d	H	B	C	D
NT-03	32	M10 x 1.25	6	17	19.6	16.5
NT-04	40	M14 x 1.5	8	22	25.4	21
NT-05	50, 63	M18 x 1.5	11	27	31.2	26
NT-08	80	M22 x 1.5	13	32	37.0	31
NT-10	100	M26 x 1.5	16	41	47.3	39
NT-12M	125	M27 x 2	16	41	47.3	39

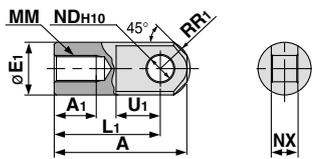
Knuckle joint pin
Clevis pin



Part no.	Bore size (mm)		Dø9	L	l	m	d (Drill through)	Cotter pin
	Clevis	Knuckle						
CD-M03 ⁽¹⁾	32, 40		10 ^{+0.040} _{-0.076}	44	36	4	3	ø3 x 18ℓ
CD-M05 ⁽¹⁾	50, 63		14 ^{+0.050} _{-0.093}	60	51	4.5	4	ø4 x 25ℓ
CD-M08 ⁽¹⁾	80, 100		22 ^{+0.065} _{-0.117}	82	72	5	4	ø4 x 35ℓ
IY-12 ⁽²⁾	125		25 ^{+0.065} _{-0.117}	79.5	69.5	5	4	ø4 x 40ℓ

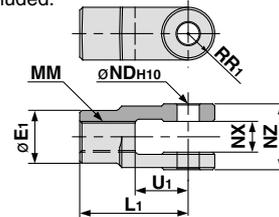
Note 1) Cotter pins and flat washers are included.
Note 2) Only pins are included.

I type single
Knuckle joint



Part no.	Bore size (mm)	A	A ₁	E ₁	L ₁	MM	R ₁	U ₁	NDH10	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	10 ^{+0.058} _{0.0}	14 ^{+0.10} _{-0.30}
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	10 ^{+0.058} _{0.0}	14 ^{+0.10} _{-0.30}
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	14 ^{+0.070} _{0.0}	20 ^{+0.10} _{-0.30}
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	22 ^{+0.084} _{0.0}	30 ^{+0.10} _{-0.30}
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	22 ^{+0.084} _{0.0}	30 ^{+0.10} _{-0.30}
I-12M	125	119	36	46	92	M27 x 2	28.5	34	25 ^{+0.084} _{0.0}	32 ^{+0.10} _{-0.30}

Y type double
Knuckle joint



Part no.	Bore size (mm)	E ₁	L ₁	MM	R ₁	U ₁	NDH10	NX	NZ
Y-03M ⁽¹⁾	32	20	30	M10 x 1.25	10	16	10 ^{+0.058} _{0.0}	14 ^{+0.30} _{+0.10}	28 ^{+0.10} _{-0.30}
Y-04M ⁽¹⁾	40	22	40	M14 x 1.5	11	19	10 ^{+0.058} _{0.0}	14 ^{+0.30} _{+0.10}	28 ^{+0.10} _{-0.30}
Y-05M ⁽¹⁾	50, 63	28	50	M18 x 1.5	14	24	14 ^{+0.070} _{0.0}	20 ^{+0.30} _{+0.10}	40 ^{+0.10} _{-0.30}
Y-08M ⁽¹⁾	80	40	65	M22 x 1.5	20	34	22 ^{+0.084} _{0.0}	30 ^{+0.30} _{+0.10}	60 ^{+0.10} _{-0.30}
Y-10M ⁽¹⁾	100	40	65	M26 x 1.5	20	34	22 ^{+0.084} _{0.0}	30 ^{+0.30} _{+0.10}	60 ^{+0.10} _{-0.30}
Y-12M ⁽¹⁾	125	46	100	M27 x 2	27	42	25 ^{+0.084} _{0.0}	32 ^{+0.30} _{+0.10}	64 ^{+0.10} _{-0.30}

Note 1) Pins, cotter pins, and flat washers are included.
Note 2) Pins and cotter pins are included.

Bracket Combinations

Bracket Combinations Available..... Refer to table together with combination drawings.

Cylinder mounting bracket	Single clevis	Double clevis	Single knuckle joint	Double knuckle joint	Clevis pivot bracket
Single clevis	—	①	—	②	—
Double clevis	③	—	④	—	⑨
Single knuckle joint	—	⑤	—	⑥	—
Double knuckle joint	⑦	—	⑧	—	⑩

No.	Appearance	No.	Appearance
①	Single clevis + Double clevis	⑥	Single knuckle joint + Double knuckle joint
②	Single clevis + Double knuckle joint	⑦	Double knuckle joint + Single clevis
③	Double clevis + Single clevis	⑧	Double knuckle joint + Single knuckle joint
④	Double clevis + Single knuckle joint	⑨	Double clevis + Clevis pivot bracket
⑤	Single knuckle joint + Double clevis	⑩	Double knuckle joint + Clevis pivot bracket

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

-X□

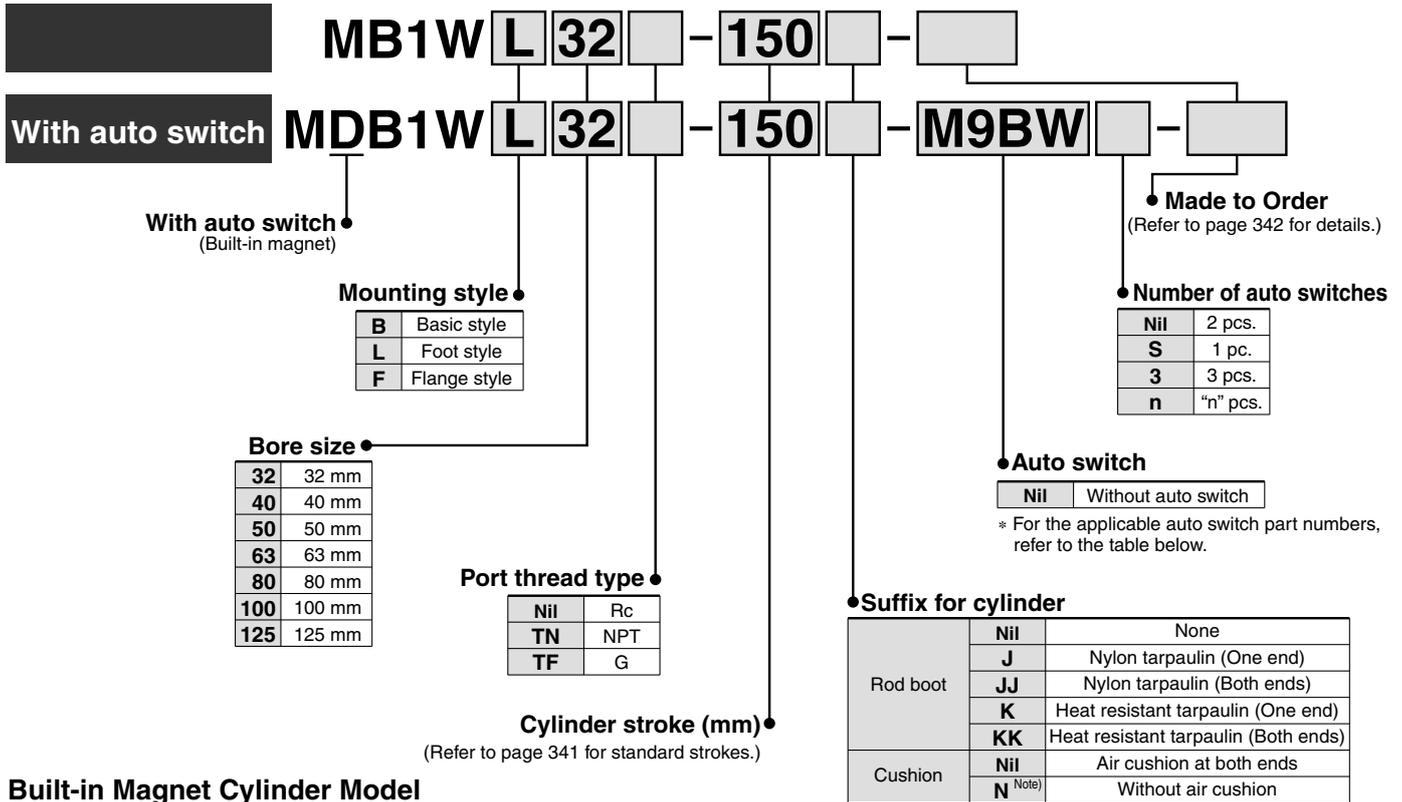
Technical data

Square Tube Type Air Cylinder: Standard Type Double Acting, Double Rod

Series **MB1W**

ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order



Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDB1WB40-100

Note) In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator/light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load					
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)							
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC			
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○					
				2-wire				M9BV	M9B	●	●	●	○	○					
	3-wire (NPN)			24V	5V, 12V	—	M9NWW	M9NW	●	●	●	○	○	IC circuit			Relay, PLC		
	3-wire (PNP)						M9PWW	M9PW	●	●	●	○	○						
	2-wire						M9BWW	M9BW	●	●	●	○	○						
	Water resistant (2-color indication)			24V	5V, 12V	—	3-wire (NPN)	M9NAV	M9NA	○	○	●	○	○			IC circuit	Relay, PLC	
							3-wire (PNP)	M9PAV	M9PA	○	○	●	○	○					
							2-wire	M9BAV	M9BA	○	○	●	○	○					
Reed switch	—	Grommet	No	3-wire (NPN equivalent)	24V	5V	—	A96V	A96	●	—	●	—	—	IC circuit	—			
				2-wire				100V	A93V	A93	●	—	●	—			—	—	Relay, PLC
								100V or less	A90V	A90	●	—	●	—			—		

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
1 m M (Example) M9NWM
3 m L (Example) M9NWL
5 m Z (Example) M9NWZ

* Solid state auto switches marked with "○" are produced upon receipt of order.

* Since there are other applicable auto switches than listed above, refer to page 350 for details.

* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.

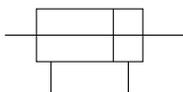
* Auto switches are shipped together (not assembled).

Square Tube Type Air Cylinder: Standard Type Double Acting, Double Rod *Series MB1W*



JIS Symbol

Double acting



Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000

Intermediate strokes are available, too.
(Spacer is not used.)

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Mounting Bracket Part No.

Bore size (mm)	32	40	50
Foot	MB-L03	MB-L04	MB-L05
Flange	MB-F03	MB-F04	MB-F05

Bore size (mm)	63	80	100
Foot	MB-L06	MB-L08	MB-L10
Flange	MB-F06	MB-F08	MB-F10

Bore size (mm)	125
Foot	MB-L12
Flange	MB-F12

Note) Order two foot brackets per cylinder.

Refer to pages 349 and 350 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Double rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Maximum operating pressure	1.0 MPa						
Minimum operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch -10 to 70°C (No freezing)						
	With auto switch -10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Piston speed	50 to 1000 mm/s						
Stroke length tolerance	Up to 250: $^{+1.0}_0$, 251 to 800: $^{+1.4}_0$						
Cushion <small>Note)</small>	Both ends (Air cushion) <small>Note)</small>						
Port size (Rc, NPT, G)	1/8	1/4	3/8	1/2			
Mounting	Basic style, Foot style, Flange style						

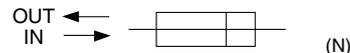
Note) In the case of w/o air cushion, it comes with rubber bumper.

Kinetic energy absorbable by the cushion mechanism is identical to double acting, single rod.

Accessory

Mounting		Basic style	Foot style	Flange style
Standard equipment	Rod end nut	●	●	●
Option	Single knuckle joint	●	●	●
	Double knuckle (With pin)	●	●	●
	Rod boot	●	●	●

Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	IN/OUT	691	138	207	276	346	415	484	553	622	691
40	16	IN/OUT	1056	211	317	422	528	634	739	845	950	1056
50	20	IN/OUT	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	IN/OUT	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	IN/OUT	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	IN/OUT	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	IN/OUT	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

Mass

Bore size (mm)		32	40	50	63	80	100	125
Basic mass	Basic style	0.59	0.82	1.39	1.72	3.22	4.27	6.68
	Foot style	0.71	0.96	1.61	2.0	3.72	4.93	8.76
	Flange style	0.88	1.19	1.84	2.51	4.67	7.58	10.86
Additional mass per each 50 mm of stroke	All mounting brackets	0.20	0.29	0.41	0.45	0.75	1.0	1.25
	Accessory bracket							
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation:

(Example) MB1WB32-100 (Basic style/ø32, 100 st)

- Basic mass.....0.59 kg
 - Additional mass.....0.20/50 stroke
 - Cylinder stroke.....100 stroke
- 0.59 + 0.20 x 100/50 = 0.99 kg

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

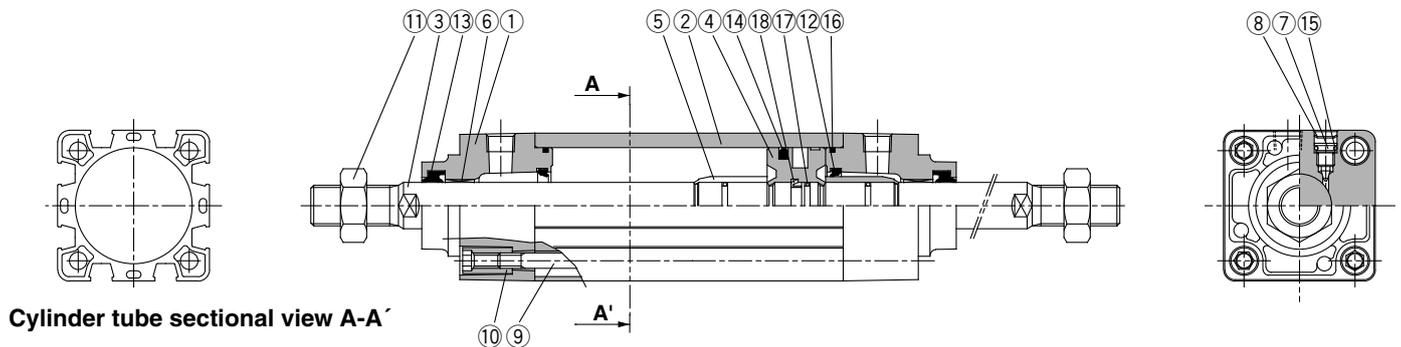
-X□

Individual
-X□

Technical
data

Series MB1W

Construction



Cylinder tube sectional view A-A

Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-casted	Metallic painted
2	Cylinder tube	Aluminum alloy	Hard anodized
3	Piston rod	Carbon steel	Hard chrome plated
4	Piston	Aluminum alloy	Chromated
5	Cushion ring	Brass	
6	Bushing	Lead-bronze casted	
7	Cushion valve	Steel wire	Nickel plated
8	Retaining ring	Spring steel	ø40 to ø100
9	Tie-rod	Carbon steel	Zinc chromated
10	Tie-rod nut	Carbon steel	Nickel plated
11	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
12 [□]	Cushion seal	Urethane	
13 [□]	Rod seal	NBR	
14 [□]	Piston seal	NBR	
15 [□]	Cushion valve seal	NBR	
16 [*]	Cylinder tube gasket	NBR	
17	Piston gasket	NBR	
18	Piston holder	Urethane	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBW32-PS	Set of the above nos. ⑫, ⑬, ⑭, ⑯
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	

- * Seal kit includes ⑫ to ⑭, ⑯. Order the seal kit, based on each bore size.
- * Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)



Made to Order Specifications
(For details, refer to pages 1395 to 1498.)

Symbol	Specifications
—XA [□]	Change of rod end shape
—XB6	Heat resistant cylinder (150°C)
—XC3	Special port location
—XC4	With heavy duty scraper
—XC5	Heat resistant cylinder (110°C)
—XC6	Piston rod and rod end nut made of stainless steel
—XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
—XC22	Fluororubber seals
—XC30	Rod side trunnion
—XC35	With coil scraper
—X846	Fastener strips mounted on switch mounting grooves

Copper/Fluorine-free

20-MB1W Mounting style Bore size Port thread type — Stroke Suffix

•Copper/fluorine-free

The type which prevents copper based ions from generating by changing the copper based materials into non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the color cathode ray tube.

Specifications

Action	Double acting, Double rod
Bore size	ø32, ø40, ø50, ø63, ø80, ø100
Max. operating pressure	1.0 MPa
Min. operating pressure	0.05 MPa
Cushion	Air cushion *
Piping	Screw-in type
Piston speed	50 to 1000 mm/s
Mounting	Basic style, Axial foot style, Rod side flange style Head side flange style, Single clevis style Double clevis style, Center trunnion style

- * Auto switch can be mounted.
- * Use within the energy absorption. (Refer to page 334.)
- * When there is no air cushion, the unit is equipped with rubber bumpers.

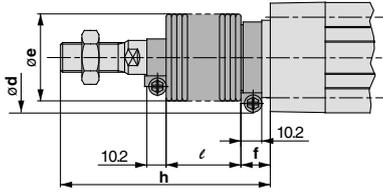
Water Resistant Air Cylinders

As compared to the standard cylinder, anti-coolant performance has been improved, and suitable for using under the atmosphere having coolant in the machine tools. Improved water resistant air cylinder, Series MB is also available, which is compliant for the environment having water splashed on the food machinery, or car washing machine, etc. Refer to page 899 for details.

Square Tube Type Air Cylinder: Standard Type Double Acting, Double Rod *Series MB1W*

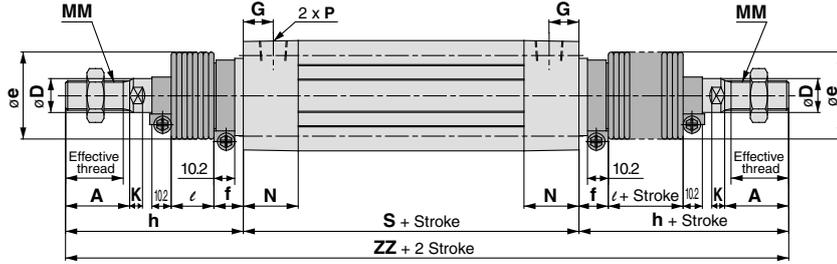
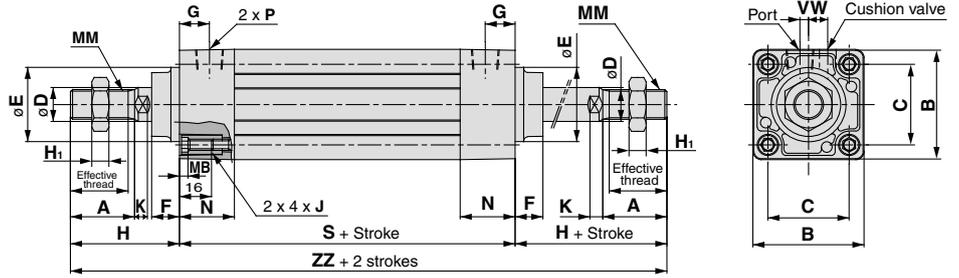
Standard Type

Basic style: (B)



With rod boot

* In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.
** In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm (In the case of trunnion style and trunnion pivot bracket).



Without Air Cushion

Bore size (mm)	Stroke range	Effective thread length	Width across flats	Dimensions (mm)																	Without Air Cushion				
				A	B	C	D	Ee11	F	G	H ₁	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*	S	ZZ
32	Up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	26.5	1/8	84	4	6.5	178	90	184
40	Up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	26.5	1/4	84	4	9	186	90	192
50	Up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31	1/4	94	5	10.5	210	102	218
63	Up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31	3/8	94	9	12	210	102	218
80	Up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	37.5	3/8	114	11.5	14	258	124	268
100	Up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	37.5	1/2	114	17	15	258	124	268
125	Up to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2.0	38	1/2	120	17	15	314	132	316

With Rod Boot

Bore size (mm)	d	e	f	ℓ												h											
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	276	—	
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	276	—	
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	120	130	140	150	170	190	210	230	250	270	290	310

Note) ZZ indicates dimensions for double side rod boot.

Bore size (mm)	ZZ (Note)											
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	230	256	280	306	356	406	456	—	—	—	—	—
40	246	272	296	322	372	422	472	—	—	—	—	—
50	272	298	322	348	398	448	498	548	—	—	—	—
63	272	298	322	348	398	448	498	548	—	—	—	—
80	316	342	366	392	442	492	542	592	642	692	—	—
100	316	342	366	392	442	492	542	592	642	692	—	—
125	340	360	380	400	440	480	520	560	600	640	680	720

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

-X□

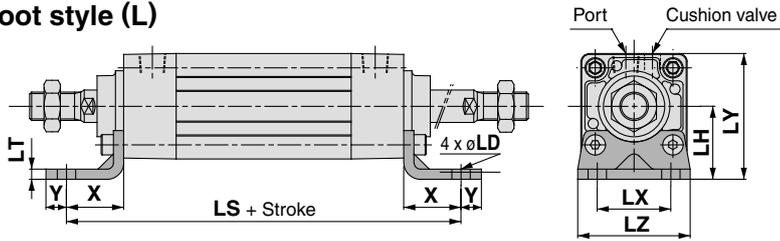
Technical data

Series MB1W

Standard Type: With Mounting Bracket

* Dimensions not indicated are the same as the standard type (page 343).

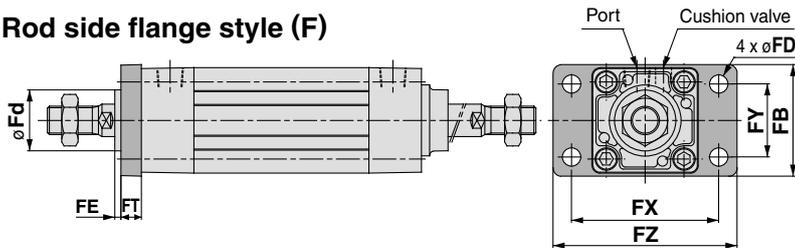
Foot style (L)



Foot Style

Bore size (mm)	Stroke range	X	Y	LD	LH	LS*	LT	LX	LY	LZ
32	Up to 500	22	9	7	30	128	3.2	32	53	50
40	Up to 500	24	11	9	33	132	3.2	38	59	55
50	Up to 600	27	11	9	40	148	3.2	46	72.5	70
63	Up to 600	27	14	12	45	148	3.6	56	82.5	80
80	Up to 800	30	14	12	55	174	4.5	72	102.5	100
100	Up to 800	32	16	14	65	178	4.5	89	122	120
125	Up to 1000	45	20	14	81	210	8	90	149	136

Rod side flange style (F)



Rod Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	Fd
32	Up to 500	50	7	10	64	32	79	25
40	Up to 500	55	9	10	72	36	90	31
50	Up to 600	70	9	12	90	45	110	38.5
63	Up to 600	80	9	12	100	50	120	39.5
80	Up to 800	100	12	16	126	63	153	45.5
100	Up to 800	120	14	16	150	75	178	54
125	Up to 1000	138	14	20	180	102	216	57.5

Square Tube Type Air Cylinder: Non-rotating Rod Double acting, Single Rod

Series MB1K

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MB1K **L** **32** **50** **M9BW**

With auto switch **MDB1K** **L** **32** **50** **M9BW**

With auto switch (Built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
(Refer to page 346 for standard strokes.)

Made to Order
(Refer to page 346 for details.)

Number of auto switches

Nil	2 pcs.
S	1 pc.
3	3 pcs.
n	"n" pcs.

Auto switch

Nil	Without auto switch
------------	---------------------

* For the applicable auto switch part numbers, refer to the table below.

Suffix for cylinder

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	Air cushion at both ends
	N (Note)	Without air cushion

- CJ1
- CJP
- CJ2
- CM2
- CG1
- MB
- MB1
- CA2
- CS1
- CS2

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.

(Example) MDB1KB40-100

Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator/light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state switch	—	Grommet	Yes	3-wire (NPN)	5V, 12V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)					●	●	●	○	○			
				2-wire	12V		M9BV	M9B	●	●	●	○	○			
	3-wire (NPN)		5V, 12V	M9NVV	M9NW		●	●	●	○	○					
	3-wire (PNP)			M9PVV	M9PW		●	●	●	○	○					
	2-wire		12V	M9BVV	M9BW		●	●	●	○	○					
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	5V, 12V	M9NAV	M9NA	○	○	●	○	○	○	IC circuit	—	
				3-wire (PNP)		M9PAV	M9PA	○	○	●	○	○				
				2-wire	12V	M9BAV	M9BA	○	○	●	○	○				
Water resistant (2-color indication)	Grommet	Yes	3-wire (NPN)	5V, 12V	M9NAV	M9NA	○	○	●	○	○	○	IC circuit	—		
			3-wire (PNP)		M9PAV	M9PA	○	○	●	○	○					
			2-wire	12V	M9BAV	M9BA	○	○	●	○	○					
Reed switch	—	Grommet	No	3-wire (NPN equivalent)	—	5V	—	A96V	A96	●	—	●	—	—	IC circuit	—
				2-wire	24V	12V	100V	A93V	A93	●	—	●	—	—	—	Relay, PLC
						100V or less		A90V	A90	●	—	●	—	—	IC circuit	—

* Lead wire length symbols: 0.5 m Nil (Example) M9NV
 1 m M (Example) M9NWM
 3 m L (Example) M9NWL
 5 m Z (Example) M9NWX

* Solid state auto switches marked with "○" are produced upon receipt of order.

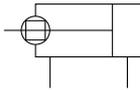
- * Since there are other applicable auto switches than listed above, refer to page 350 for details.
- * For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.
- * Auto switches are shipped together (not assembled).

- D-□
- X□
- Individual
- X□
- Technical data

Series MB1K



JIS Symbol



Made to Order Specifications
(For details, refer to pages 1373 to 1565.)

Symbol	Specifications
—XA□	Change of rod end shape
—XC3	Special port location
—XC6	Piston rod and rod end nut made of stainless steel
—XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
—XC8	Adjustable stroke cylinder/Adjustable extension type
—XC9	Adjustable stroke cylinder/Adjustable retraction type
—XC10	Dual stroke cylinder/Double rod type
—XC27	Double clevis pin and double knuckle pin made of stainless steel
—XC30	Rod side trunnion
—X846	Fastener strips mounted on switch mounting grooves

Mounting Bracket Part No.

Bore size (mm)	32	40	50
Foot ⁽¹⁾	MB-L03	MB-L04	MB-L05
Flange	MB-F03	MB-F04	MB-F05
Single clevis	MB-C03	MB-C04	MB-C05
Double clevis	MB-D03	MB-D04	MB-D05

Bore size (mm)	63	80	100
Foot ⁽¹⁾	MB-L06	MB-L08	MB-L10
Flange	MB-F06	MB-F08	MB-F10
Single clevis	MB-C06	MB-C08	MB-C10
Double clevis	MB-D06	MB-D08	MB-D10

Note 1) Order two foot brackets per cylinder.

Note 2) Accessories for each mounting bracket are as follows: Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, cotter pins and flat washer. Refer to page 339 for details.

Refer to pages 349 and 350 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Maximum operating pressure	1.0 MPa					
Minimum operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch -10 to 70°C (No freezing)					
	With auto switch -10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Piston speed	50 to 1000 mm/s					
Stroke length tolerance ^{Note)}	Up to 250: $^{+1.0}_0$, 251 to 1000: $^{+1.4}_0$, 1001 to 1500: $^{+1.8}_0$					
Cushion	Both ends (Air cushion) ^{Note)}					
Port size (Rc, NPT, G)	1/8	1/4	3/8	1/2		
Mounting	Basic style, Foot style, Rod side flange style, Head side flange style Single clevis style, Double clevis style					
Rod non-rotating accuracy	ø32, ø40	±0.5°				
	ø50, ø63	±0.5°				
	ø80, ø100	±0.3°				
Allowable rotational torque (N·m or less)	ø32	0.25	ø80		0.79	
	ø40	0.45	ø100		0.93	
	ø50, ø63	0.64	—		—	

Note) In the case of w/o air cushion, it comes with rubber bumper.

Kinetic energy absorbable by the cushion mechanism is identical to double acting, single rod.

Accessory

Mounting		Basic style	Foot style	Rod side Flange style	Head side flange style	Single clevis style	Double clevis style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

Intermediate strokes are available, too.
(Spacer is not used.)

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Theoretical Output

OUT side is the same value as double acting, single rod. But, IN side is different. For IN side, refer to the table below.

Bore size (mm)	Piston area (mm ²)	Bore size (mm)	Piston area (mm ²)
32	675	63	2804
40	1082	80	4568
50	1651	100	7223

Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

Square Tube Type Air Cylinder: Non-rotating Rod Type *Series MB1K*

Mass

(kg)

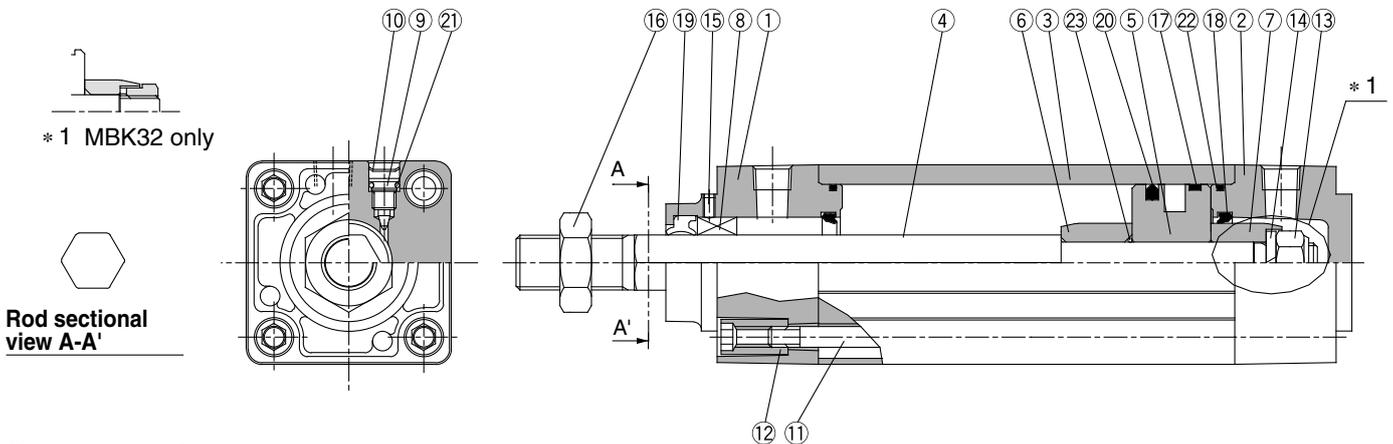
Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic style	0.53	0.69	1.26	1.58	2.69	3.86
	Foot style	0.65	0.83	1.48	1.86	3.19	4.52
	Flange style	0.82	1.06	1.69	2.37	4.14	7.17
	Single clevis style	0.78	0.92	1.60	2.21	3.8	7.03
	Double clevis style	0.79	0.96	1.69	2.37	4.09	7.55
Additional mass per each 50 mm of stroke	All mounting brackets	0.16	0.21	0.33	0.37	0.56	0.72
	Accessory bracket						
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation:

(Example) **MB1K32-100** (Basic style/ø32, 100 st)

- Basic mass.....0.53 kg
 - Additional mass.....0.16/50 stroke
 - Cylinder stroke.....100 stroke
- $0.53 + 0.16 \times 100/50 = 0.85$ kg

Construction



Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-casted	Metallic painted
2	Head cover	Aluminum die-casted	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Stainless steel	
5	Piston	Aluminum alloy	Chromated
6	Cushion ring A	Rolled steel	
7	Cushion ring B	Rolled steel	
8	Non-rotating guide	Oil-impregnated sintered alloy	
9	Cushion valve	Steel wire	Nickel plated
10	Retaining ring	Spring steel	ø40 to ø100
11	Tie-rod	Carbon steel	Zinc chromated
12	Tie-rod nut	Carbon steel	Nickel plated

No.	Description	Material	Note
13	Piston nut	Rolled steel	
14	Spring washer	Steel wire	
15	Set screw	Steel wire	
16	Rod end nut	Carbon steel	Nickel plated
17	Wear ring	Resin	
18*	Cushion seal	Urethane	
19*	Rod seal	NBR	
20*	Piston seal	NBR	
21	Cushion valve seal	NBR	
22*	Cylinder tube gasket	NBR	
23	Piston gasket	NBR	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBK32 — PS	Set of the above nos. 18, 19, 20, 22
40	MBK40 — PS	
50	MBK50 — PS	
63	MBK63 — PS	
80	MBK80 — PS	
100	MBK100 — PS	

- * Seal kit includes 18 to 20, 22. Order the seal kit, based on each bore size.
- * Seal kit includes a grease pack (ø32 to 50 : 10 g, ø63, 80 : 20 g, ø100 : 30 g).
- Order with the following part number when only the grease pack is needed.
- Grease pack part number : GR-S-010 (10 g), GR-S-020 (20 g)**

* In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual

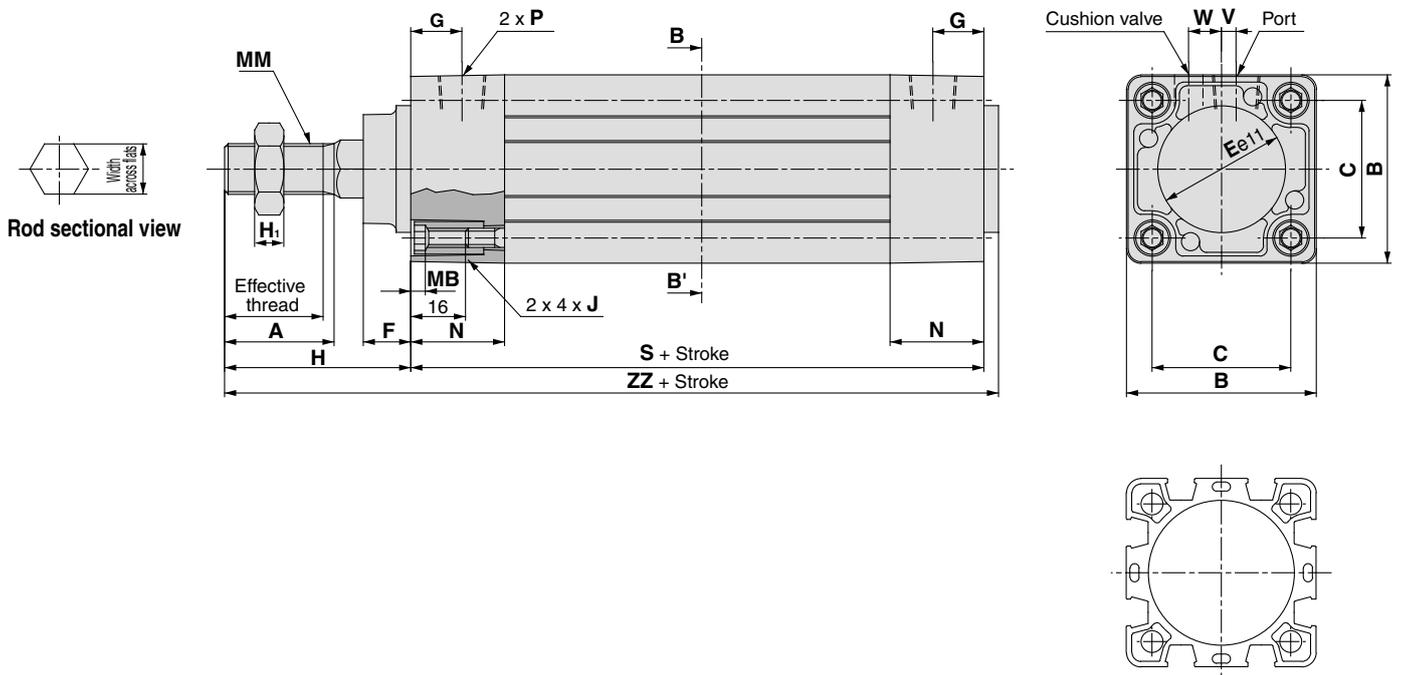
-X□

Technical data

Series MB1K

Standard Type

Basic style: (B)



Cylinder tube sectional view B-B'

Bore size (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	E	F	G	H ₁	MB	J	MM	N	P	S	V	W	H	ZZ
32	Up to 500	19.5	12.2	22	46	32.5	30	13	13	6	4	M6 x 1	M10 x 1.25	26.5	1/8	84	4	6.5	47	135
40	Up to 500	27	14.2	30	52	38	35	13	14	8	4	M6 x 1	M14 x 1.5	26.5	1/4	84	4	9	51	139
50	Up to 600	32	19	35	65	46.5	40	14	15.5	11	5	M8 x 1.25	M18 x 1.5	31	1/4	94	5	10.5	58	156
63	Up to 600	32	19	35	75	56.5	45	14	16.5	11	5	M8 x 1.25	M18 x 1.5	31	3/8	94	9	12	58	156
80	Up to 800	37	23	40	95	72	45	20	19	13	5	M10 x 1.5	M22 x 1.5	37.5	3/8	114	11.5	14	72	190
100	Up to 800	37	27	40	114	89	55	20	19	16	5	M10 x 1.5	M26 x 1.5	37.5	1/2	114	17	15	72	190

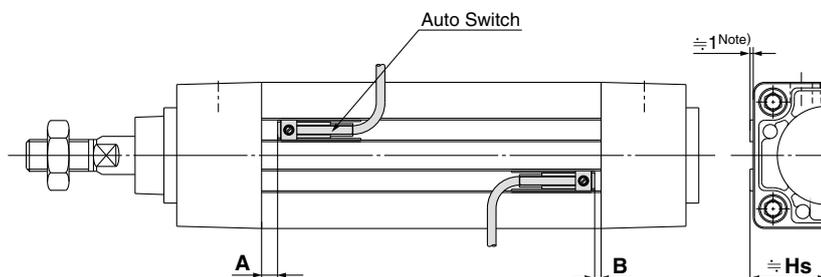
Minimum Auto Switch Mounting Stroke

Auto switch model	No. of auto switch mounted	ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□ D-A9□V	2 (Different surfaces, Same surface)	15						
	1	15						
	n	15 + 10 (n - 2)		15 + 15 (n - 2)			15 + 20 (n - 2)	
D-M9□ D-M9□V	2 (Different surfaces, Same surface)	15						
	1	15						
	n	15 + 5 (n - 2)			10 + 10 (n - 2)			
D-M9□W D-M9□WV D-M9□AL D-M9□AVL	2 (Different surfaces, Same surface)	15						
	1	15						
	n	15 + 10 (n - 2)			10 + 10 (n - 2)		10 + 15 (n - 2)	
D-Z7□ D-Z80	2 (Different surfaces, Same surface)	25						
	1	25						
	n	25 + 15 (n - 2)			15 + 15 (n - 2)		15 + 20 (n - 2)	
D-Y59□/Y69□ D-Y7P/Y7PV	2 (Different surfaces, Same surface)	25						
	1	25						
	n	25 + 10 (n - 2)			15 + 10 (n - 2)		15 + 15 (n - 2)	
D-Y7□W D-Y7□WV	2 (Different surfaces, Same surface)	25						
	1	25						
	n	25 + 10 (n - 2)			20 + 10 (n - 2)		20 + 15 (n - 2)	
D-Y7BAL	2 (Different surfaces, Same surface)	30						
	1	30						
	n	30 + 10 (n - 2)			20 + 10 (n - 2)		20 + 15 (n - 2)	

Note 1) n = 3, 4, 5 ...

Note 2) Center trunnion type is not included.

Proper Auto Switch Mounting Position (Detection at stroke end) and Mounting Height



Proper Auto Switch Mounting Position (mm)

Auto switch model	Auto switch model					
	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-A9□ D-A9□V		D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BAL	
Bore size	A	B	A	B	A	B
32	9	6	5	2	4	1
40	9	6	5	2	4	1
50	9	7	5	3	4	2
63	9	7	5	3	4	2
80	12.5	10.5	8.5	6.5	7.5	5.5
100	12.5	10.5	8.5	6.5	7.5	5.5
125	14.5	14.5	10.5	10.5	9.5	9.5

Note) Adjust the auto switch after confirming the operation to set actually.

Auto Switch Mounting Height (mm)

Auto switch model	Auto switch model	
	D-A9□V D-Y69□ D-Y7PV D-Y7□WV	D-M9□V D-M9□WV D-M9□AVL
Bore size	Hs	Hs
32	27	30
40	30	33
50	36	39
63	41	44
80	51	54
100	60.5	63.5
125	71.5	74.5

Note) The above figures are for when the electrical entry in-line types D-A9□/M9□/M9□W/M9□AL/Z7□/Z80/Y59□/Y7P/Y7□W/Y7BAL are mounted.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

Technical
data

Series MB1

Operating Range

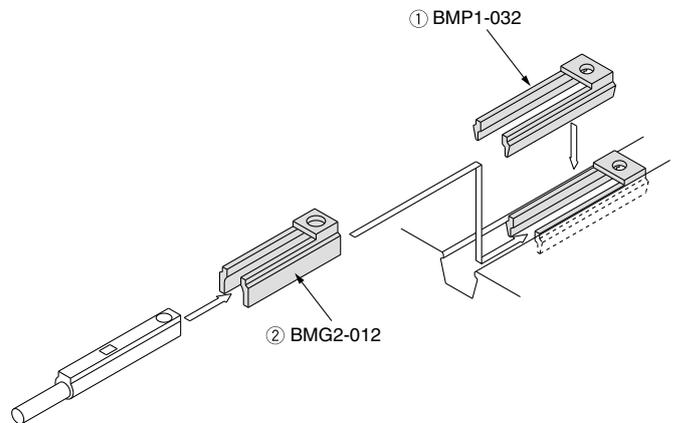
Auto switch model	Bore size (mm)						
	32	40	50	63	80	100	125
D-A9□/A9□V	7	7.5	8	9	9.5	10.5	12.5
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	4	4.5	5	6	6	6	7
D-Z7□Z80	10	10	10	11	11	12	14
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BAL	6.5	6.5	6	7	7	8	7

Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)
	ø32 to ø125
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	Note) ① BMP1-032 ② BMG2-012
D-Z7□/Z80 D-Y5□/Y7P D-Y7□W D-Y6□/Y7PV D-Y7□WV D-Y7BAL	① BMP1-032

Note) Two kinds of auto switch brackets are used as a set.

D-A9□ (V)/M9□ (V)/M9□W (V)/M9□A (V)L



Besides the models listed in How to Order, the following auto switches are applicable. Refer to pages 1263 to 1371 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Entry direction)	Features
Reed	D-Z73, Z76	Grommet (in-line)	—
	D-Z80		With indicator light
Solid state	D-Y69A, Y69B, Y7PV	Grommet (perpendicular)	—
	D-Y7NWV, Y7PWV, Y7BWV		Diagnosis indication (2 colors)
	D-Y59A, Y59B, Y7P	Grommet (in-line)	—
	D-Y7NW, Y7PW, Y7BW		Diagnosis indication (2 colors)

* For solid state switches, auto switches with a pre-wired connector are also available. Refer to pages 1328 and 1329 for details.

* Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H/Y7G/Y7H types) are also available. Refer to pages 1290 and 1292 for details.



Series MB1

Specific Product Precautions

Be sure to read before handling.

Refer to front matters 54 and 55 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Adjustment

Warning

- Do not open the cushion valve beyond the stopper.**
Crimping ($\phi 32$) or a snap ring ($\phi 40$ to $\phi 100$) is provided to prevent the accidental removal of the cushion valve. Do not open the valve beyond the mechanism.
If not operated in accordance with the above precautions, the cushion valve may be ejected from the cover when air pressure is supplied.

Bore size (mm)	Cushion valve width across flats	Hexagon wrench
32, 40	2.5	JIS 4648 Hexagon wrench key 2.5
50, 63	3	JIS 4648 Hexagon wrench key 3
80, 100	4	JIS 4648 Hexagon wrench key 4
125	4	JIS 4648 Hexagon wrench key 4

- Use the air cushion at the end of cylinder stroke.**
When it is intended to use the cushion valve in the fully open position, select the type with damper. If this is not done, the tie-rods or piston rod assembly will be damaged.
- When replacing mounting bracket, use a hexagon wrench.**

Bore size (mm)		Bolt	Width across flats	Tightening torque (N·m)
32, 40		MB-32-48-C1247	4	5.1
50, 63		MB-50-48-C1249	5	11
80, 100	Foot	MB-80-48AC1251	6	25
	Others	MB-80-48BC1251		
125	Foot	M12 x 1.75 x 25L	8	30.1
	Others	M12 x 1.75 x 28L		

- When replacing a bracket, tie-rod nuts on the cylinder body may become loosened.**
After retightening the tie-rod nuts with the proper tightening torque (Refer to Adjustment 3.), mount a mounting bracket.

Non-rotating rod type (Double acting, Single rod)

Operating Precautions

Caution

- Avoid using the air cylinder in such a way that more than allowable rotational torque would be applied to the piston rod.**

If rotational torque is applied, the non-rotating guide will deform, thus affecting the non-rotating accuracy. This may cause damage to machinery.

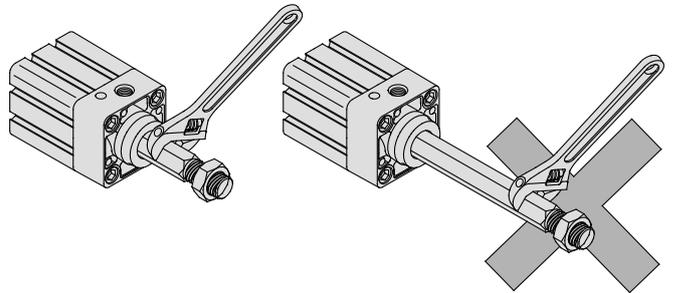
Mounting/Piping

Caution

- Mounting a workpiece on rod end**

To screw a bracket or a nut onto the threaded portion at the tip of the piston rod, make sure to retract the piston rod entirely, and place a wrench over the flat portion of the rod that protrudes.

Tighten it by giving consideration to prevent the tightening torque from being applied to the non-rotating guide.



CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

CS2

D-□

-X□

Individual
-X□

Technical
data

Cylinder with Lock

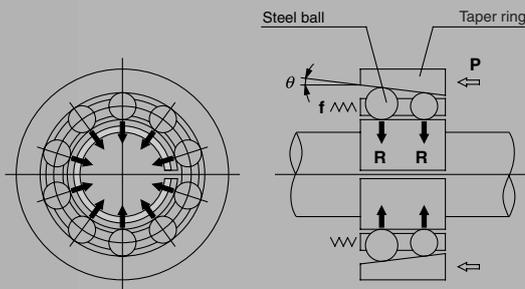
Series MNB

ø32, ø40, ø50, ø63, ø80, ø100

A locking cylinder ideal for intermediate stops, emergency stops and drop prevention.

Simple construction

A force magnifying mechanism is employed based on the wedge effect of the taper ring and steel balls.



Maximum piston speed: 1000 mm/s

It can be used at 50 to 1000 mm/s provided that it is within the allowable kinetic energy range.



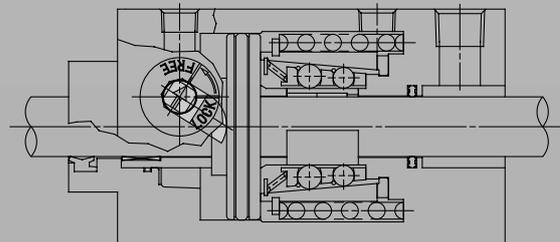
Manual override for unlocking

Even if the air supply is blocked or exhausted, lock release is possible.

The fail safe mechanism locks again when the manual override is released.

High locking efficiency

Greater locking efficiency as well as stable locking and unlocking operation has been achieved by arranging a large number of steel ball bearings in circular rows. (Unlocking pressure of 0.25 MPa 0.05 MPa lower than conventional SMC products) In addition, both alignability and stable locking force with respect to piston rod eccentricity are obtained by allowing the taper ring to float.



High reliability and stable holding force

Outstanding durability and stable holding force are maintained by the use of a brake shoe having superior wear resistance, which has also been substantially lengthened (double the conventional SMC product).

Design minimizes the influences of unlocking air quality

A construction which is strong against moisture and drainage in the compressed air has been realized by separating the locking mechanism and the unlocking chamber.

Series Variations

Series	Action	Type	Standard variations	Bore size (mm)	Lock holding force (N)	Max. stroke (mm)
			With rod boot			
Cylinder with lock Series MNB	Double acting	Single rod Series MNB		32	552	700
				40	882	800
				50	1370	1000
		Double rod Series MNBW		63	2160	1000
				80	3430	1000
				100	5390	1000

Can be locked in both directions

An equal holding force can be obtained on either reciprocating stroke of the cylinder.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

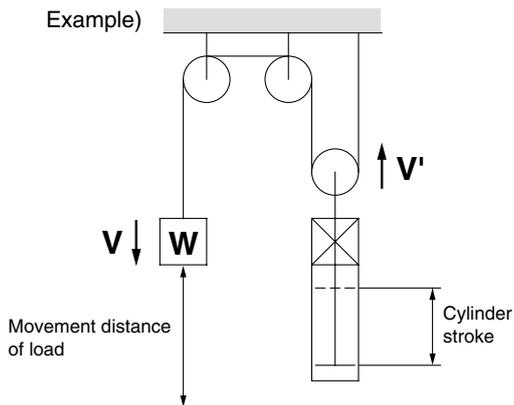
Individual -X□

Series MNB Model Selection

Precautions on Model Selection

⚠ Caution

1. In order that the originally selected maximum speed shall not be exceeded, be certain to use a speed controller to adjust the total movement distance of the load so that movement takes place in no less than the applicable movement time. The movement time is the time that is necessary for the load to travel the total movement distance from the start without any intermediate stops.
2. In cases where the cylinder stroke and the movement distance of the load are different (double speed mechanism, etc.), use the movement distance of the load for selection purposes.



3. The following selection example and procedures are based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) on page 695 depending on the operating pressure and select models.

Selection Example

- Load mass : $m = 50$ kg
- Movement distance : $st = 500$ mm
- Movement time : $t = 2$ s
- Load condition : Vertical downward = Load in direction of rod extension
- Operating pressure : $P = 0.4$ MPa

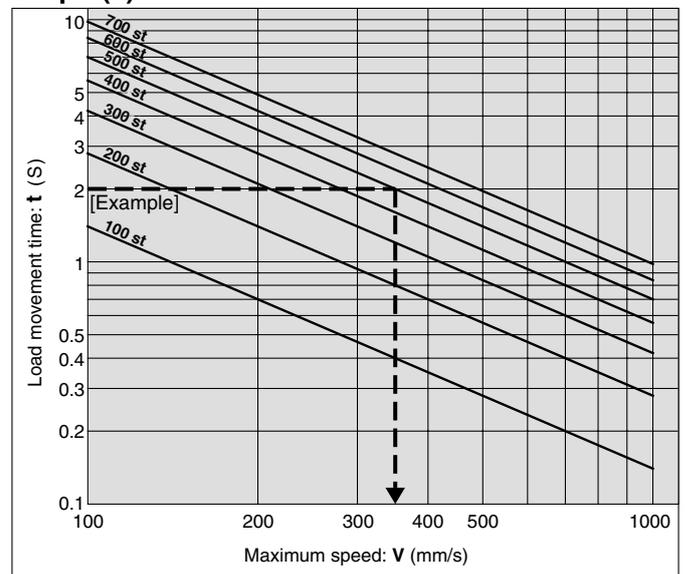
Step (1): From graph (1) find the maximum movement speed of the load
 \therefore Maximum speed $V = \cong 350$ mm/s.

Step (2): Select graph (6) based upon the load conditions and operating pressure, and then from the intersection of the maximum speed $V = 350$ mm/s found in Step (1), and the load mass $m = 50$ kg.
 $\therefore \phi 63 \rightarrow$ select a MNB63 or larger bore size.

Step (1) Find the maximum load speed V .

Find the maximum load speed: V (mm/s) from the load movement time: t (s) and the movement distance: st (mm).

Graph (1)



Step (2) Find the bore size.

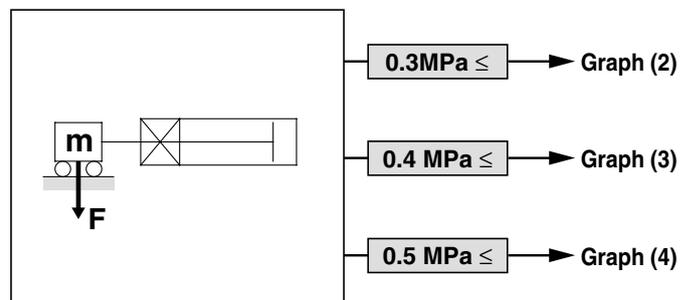
Select a graph based upon the load condition and operating pressure, and then find the point of intersection for the maximum speed found in Step (1) and the load mass. Select the bore size on the above the point of intersection.

Load Condition

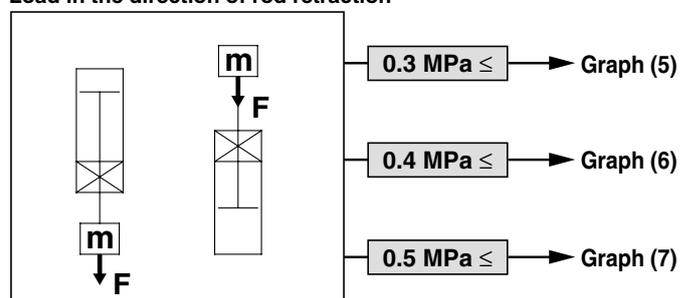
Operating pressure

Load in the direction at the right angle to rod

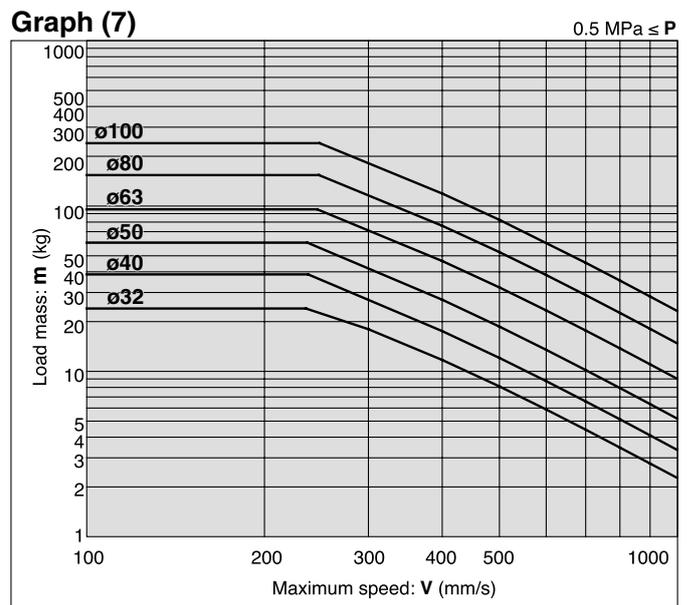
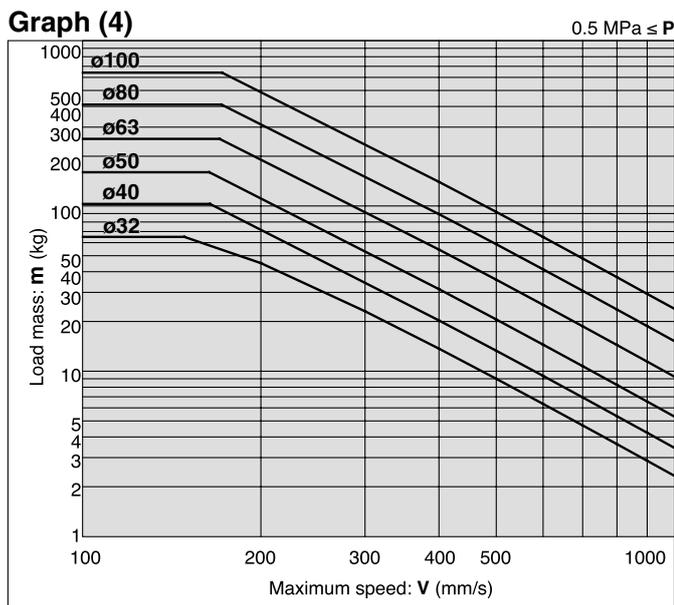
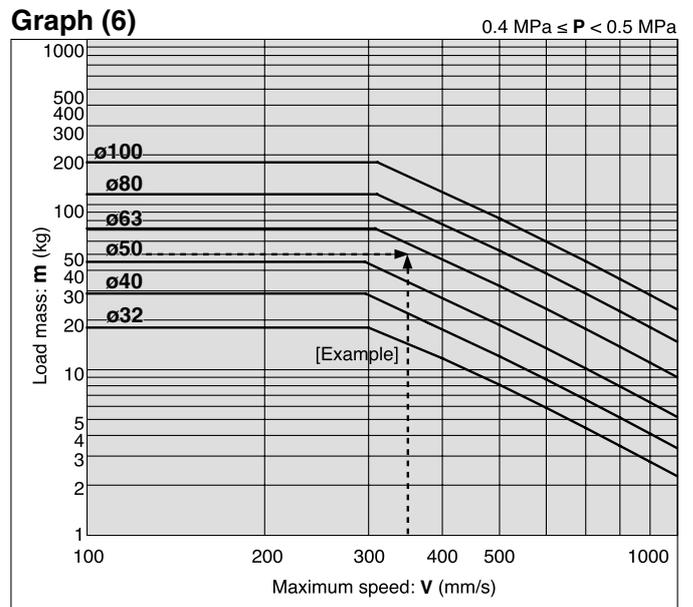
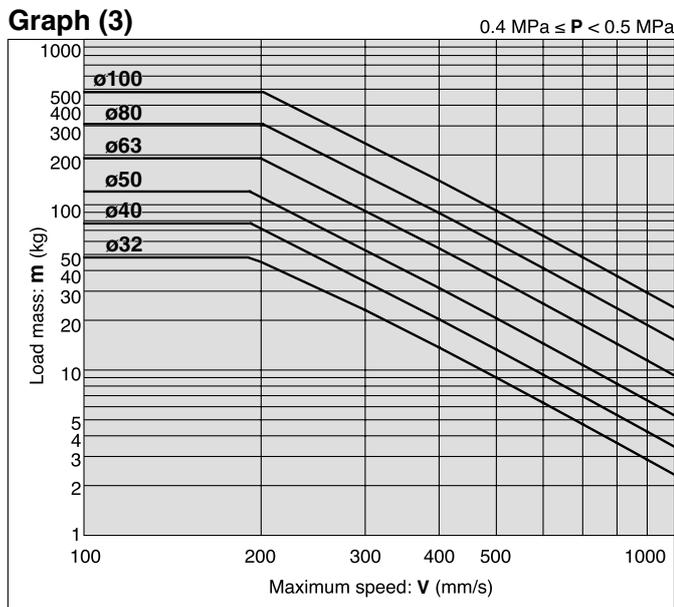
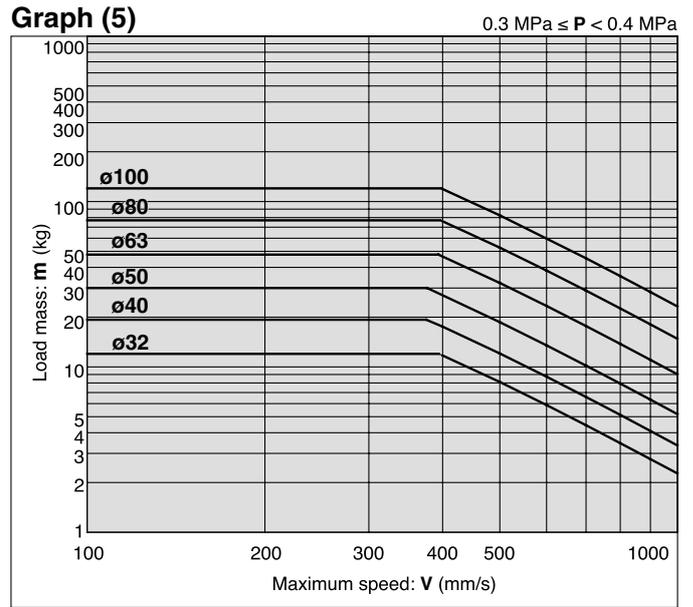
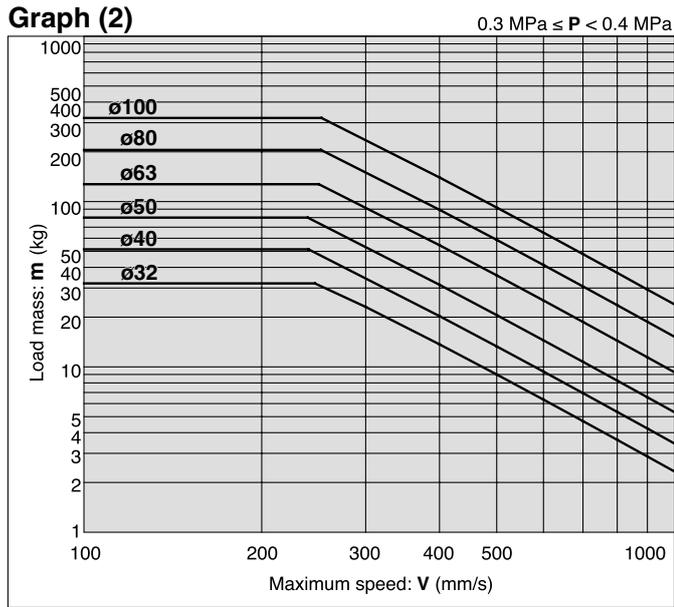
(* Being held by a guide)



Load in the direction of rod extension
 Load in the direction of rod retraction



Selection Graph



CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual

-X□

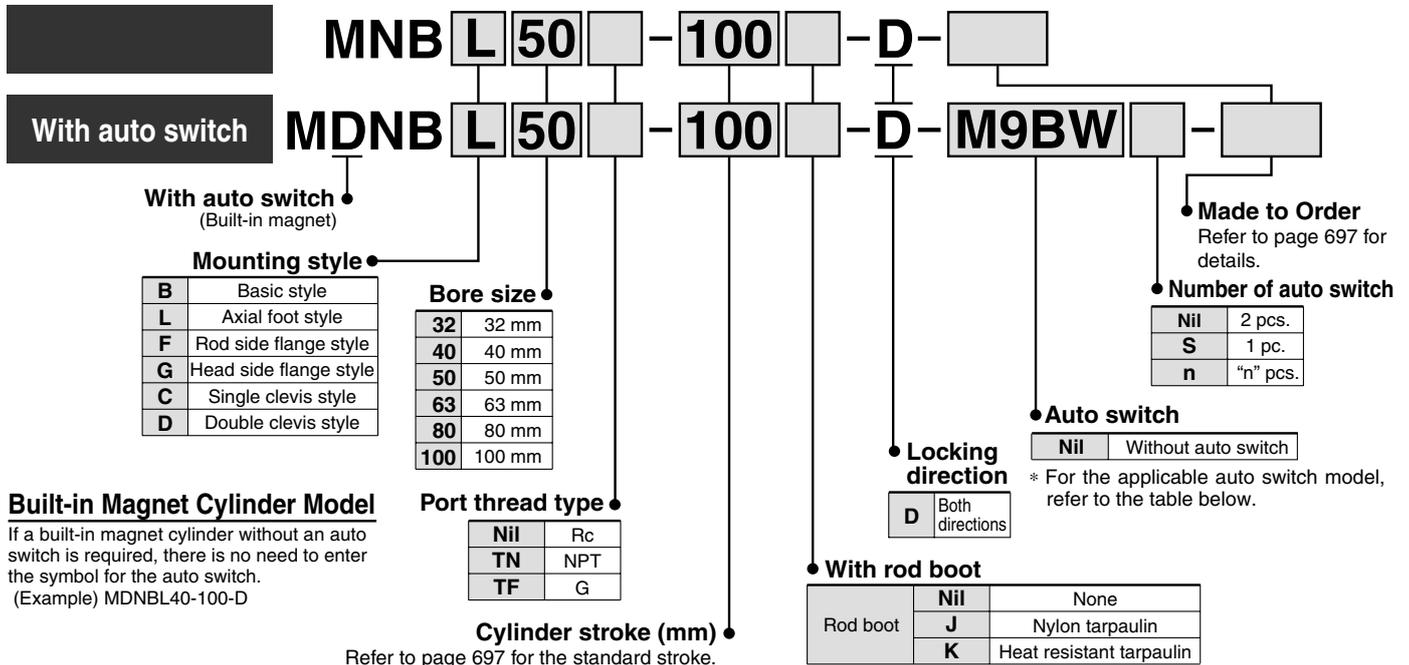
Cylinder with Lock

Double Acting, Single Rod

Series MNB

ø32, ø40, ø50, ø63, ø80, ø100

How to Order



Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load			
					DC	AC		Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)					
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC		
				3-wire (PNP)				—	●	●	●	○	○					
				2-wire	—	—	100 V, 200 V	M9B	—	●	●	○	○					
		3-wire (NPN)		24 V	5 V, 12 V	—	J51	—	●	—	○	○	—					
		2-wire					—	—	—	—	—	—	—					
		Diagnostic indication (2-color indication)		Terminal conduit	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	G39	—	—	—	—			—	—
	2-wire		—			—				—	—	—	—	—				
	3-wire (NPN)		24 V			5 V, 12 V	—	M9NW	—	●	●	●	○	○				
	3-wire (PNP)			M9PW				—	●	●	●	○	○					
	Water resistant (2-color indication)		Grommet	Yes		2-wire	24 V	12 V	—	M9BW	—	●	●	○	○		—	
						3-wire (NPN)				M9NA	—	○	○	●	○		○	
		3-wire (PNP)			M9PA	—	○	○	●	○	○							
2-wire		—	12 V		—	M9BA	—	○	○	●	○	○						
4-wire (NPN)		—	5 V, 12 V		—	F59F	—	●	—	●	○	○						
2-wire (Non-polar)		—	—		—	P4DW	—	—	—	●	●	○						
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	5 V	—	A96	—	●	—	●	—	—	IC circuit	Relay, PLC		
				2-wire				100 V	A93	—	●	—	●	—	—			
					100 V or less	A90	—	●	—	●	—	—						
					100 V, 200 V	A54	—	●	—	●	●	—						
					200 V or less	A64	—	●	—	●	—	—						
		Terminal conduit		Yes	—	—	—	A33	—	—	—	—	—	—	—			
					—	—	—	A34	—	—	—	—	—	—				
					—	—	—	A44	—	—	—	—	—	—				
					100 V, 200 V	—	—	—	—	—	—	—	—	—				
					—	—	—	A59W	—	●	—	●	—	—				
DIN terminal	Yes	—	—	—	—	—	—	—	—	—	—	—						
		—	—	—	—	—	—	—	—	—	—							
Diagnostic indication (2-color indication)	Grommet	Yes	—	—	—	—	—	—	—	—	—	—	—	—				
			—	—	—	—	—	—	—	—	—	—	—					

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
 1 m M (Example) M9NWM
 3 m L (Example) M9NWL
 5 m Z (Example) M9NWX

* Solid state auto switches marked with "○" are produced upon receipt of order.

* Since there are other applicable auto switches than listed, refer to page 717 for details.

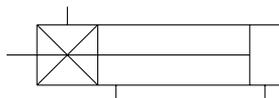
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.

* D-A9□/M9□//M9□W/M9□AL auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment.)

Cylinder Specifications



JIS Symbol
Cylinder with brake



Made to Order Specifications

(For details, refer to pages 1836 and 1926.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC35	With coil scraper

Refer to pages 714 to 717 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (Non-lube)					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.08 MPa					
Piston speed	50 to 1000 mm/s *					
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)					
Cushion	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_0$; 251 to 1000: $^{+1.4}_0$					
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style					

* Load limits exist depending upon piston speed when locked, mounting direction and operating pressure.

Lock Specifications

Bore size (mm)	32	40	50	63	80	100
Locking action	Spring locking (Exhaust locking)					
Unlocking pressure	0.25 MPa or more					
Lock starting pressure	0.20 MPa or less					
Max. operating pressure	1.0 MPa					
Locking direction	Both directions					
Holding force N	552	882	1370	2160	3430	5390

* Be sure to select cylinders in accordance with the procedures on page 694.

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 716).

Bore size (mm)	Standard stroke (mm) ⁽¹⁾	Maximum manufacturable stroke (mm)
32, 40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	ø32 : 700 ø40 : 800
50, 63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80, 100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000

Note 1) Intermediate strokes other than the above are produced upon receipt of order. Spacers are not used for intermediate strokes.

Note 2) When exceeding the stroke range for each bracket, determine the maximum strokes referring to the Selection Table (front matter 29 in Best Pneumatics No. 2).

Stopping Accuracy

Lock type	Piston speed (mm/s)			
	100	300	500	1000
Spring locking	±0.3	±0.6	±1.0	±2.0

Condition: Lateral, Supply pressure P = 0.5 MPa

Load mass Upper limit of allowed value

Solenoid valve for locking mounted on the unlocking port

Maximum value of stopping position dispersion from 100 measurements

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□

Series MNB

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot ⁽¹⁾	MB-L03	MB-L04	MB-L05	MNB-L06*	MB-L08	MB-L10
Flange	MNB-F03*	MNB-F04*	MNB-F05*	MNB-F06*	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) When ordering foot bracket, order 2 pieces per cylinder.

Note 2) Accessories for each mounting bracket are as follows.

Foot, Flange, Single clevis: Body mounting bolts

Double clevis: Clevis pin, Cotter pin, Flat washer, Body mounting bolts

Note 3) All are common to the MB series air cylinders, except the sections marked with a "*".

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	20°C
K	Heat resistant tarpaulin	110°C *

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Head side flange style	Single clevis style	Double clevis style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●

Single Rod Mass/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic style	1.20	1.72	2.76	4.06	6.85	10.26
	Foot style	1.30	1.84	2.94	4.32	7.28	10.85
	Flange style	1.44	2.04	3.29	4.80	8.30	13.57
	Single clevis style	1.45	1.98	3.10	4.69	7.96	13.43
	Double clevis style	1.46	1.99	3.19	4.85	8.25	13.95
Additional mass per each 50 mm of stroke	All mounting brackets	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation:

(Example) **MNBB32-100-D** (Basic type, ø32, 100 st)

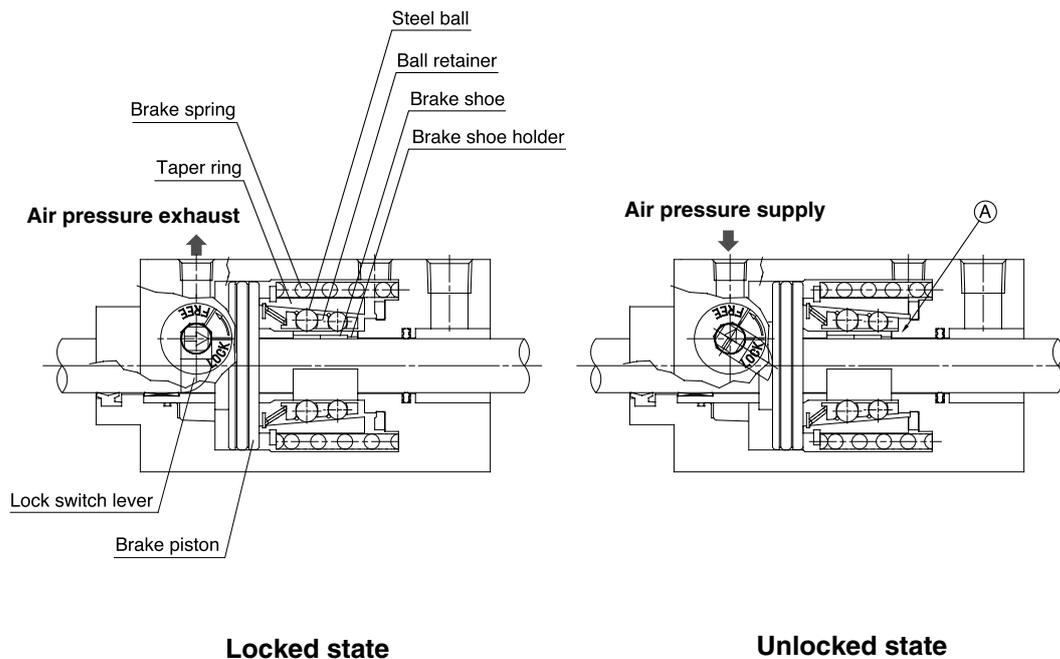
• Basic mass.....1.20 (Basic style, ø32)

• Additional mass 0.11/50 stroke

• Cylinder stroke 100 stroke

$$1.20 + 0.11 \times 100/50 = 1.42 \text{ kg}$$

Construction Principle



CLJ2
CLM2
CLG1
CL1
MLGC
CNG
MNB
CNA
CNS
CLS
CLQ
RLQ
MLU
MLGP
ML1C

Spring locking (Exhaust locking)

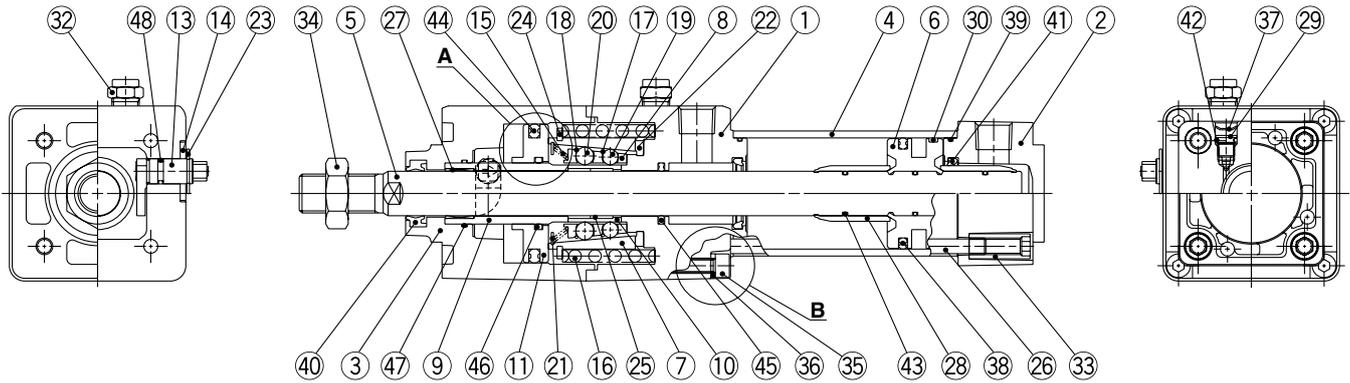
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.

Unlocking is accomplished when air pressure is supplied to the unlocking port. The brake piston and taper ring oppose the spring force, moving to the right side, and the ball retainer strikes the cover section A. The braking force is released as the steel balls are removed from the taper ring by the ball retainer.

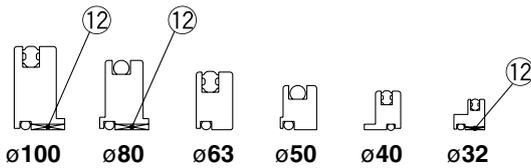
D-□
-X□
Individual -X□

Series MNB

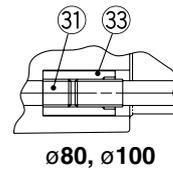
Construction



A section



B section



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Hard anodized and metallic painted
②	Head cover	Aluminum die-casted	Chromated and metallic painted
③	Cover	Aluminum alloy	Hard anodized and metallic painted
④	Cylinder tube	Aluminum alloy	Hard anodized
⑤	Piston rod	Carbon steel	Hard chrome plated
⑥	Piston	Aluminum alloy	Chromated
⑦	Taper ring	Carbon steel	Heat treated
⑧	Ball retainer	Special resin	
⑨	Piston guide	Carbon steel	Zinc chromated
⑩	Brake shoe holder	Special steel	Heat treated
⑪	Release piston	Aluminum alloy	③2, ⑧0, ⑩00
			④0, ⑤0, ⑥3
⑫	Release piston bushing	Steel + Special resin	③2, ⑧0, ⑩00 only
⑬	Unlocking cam	Chromium molybdenum steel	Glossy chromated
⑭	Washer	Carbon steel	Colorless zinc chromated
⑮	Retainer pre-load spring	③2	Steel wire
		④0 to ⑩00	Stainless steel wire
⑯	Brake spring	Steel wire	
⑰	Clip A	Stainless steel	Zinc chromated
⑱	Clip B	Stainless steel	
⑲	Steel ball A	Carbon steel	
⑳	Steel ball B	Carbon steel	
㉑	Tooth ring	Stainless steel	
㉒	Bumper	Polyurethane rubber	
㉓	Type C retaining ring for unlocking cam shaft	Carbon steel	
㉔	Type C retaining ring for taper ring	Carbon steel	
㉕	Brake shoe	Babbitt	
㉖	Tie-rod	Carbon steel	Zinc chromated
㉗	Bushing	Copper alloy	
㉘	Cushion ring	Brass	

Component Parts

No.	Description	Material	Note
㉙	Cushion valve	Steel wire	Nickel plated
㉚	Wear ring	Resin	
㉛	Unit holding tie-rod	Carbon steel	Chromated ⑧0, ⑩00 only
㉜	BC element		
㉝	Tie-rod nut	Carbon steel	Nickel plated
㉞	Rod end nut	Carbon steel	Nickel plated
㉟	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated ③2 to ⑥3
㊱	Spring washer for hex. socket head cap screw	Steel wire	Nickel plated ③2 to ⑥3
㊲	Retaining ring	Spring steel	
㊳	Piston seal	NBR	
㊴	Cylinder tube gasket	NBR	
㊵	Rod seal A	NBR	
㊶	Cushion seal	NBR	
㊷	Cushion valve seal	NBR	
㊸	Piston gasket	NBR	
㊹	Release piston seal	NBR	
㊺	Rod seal B	NBR	
㊻	Release piston gasket	NBR	
㊼	Piston guide gasket	NBR	
㊽	Unlocking cam gasket	NBR	

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
32	MB32-PS	A set of ㉝, ㉞, ㊵ and ㊶ above
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	

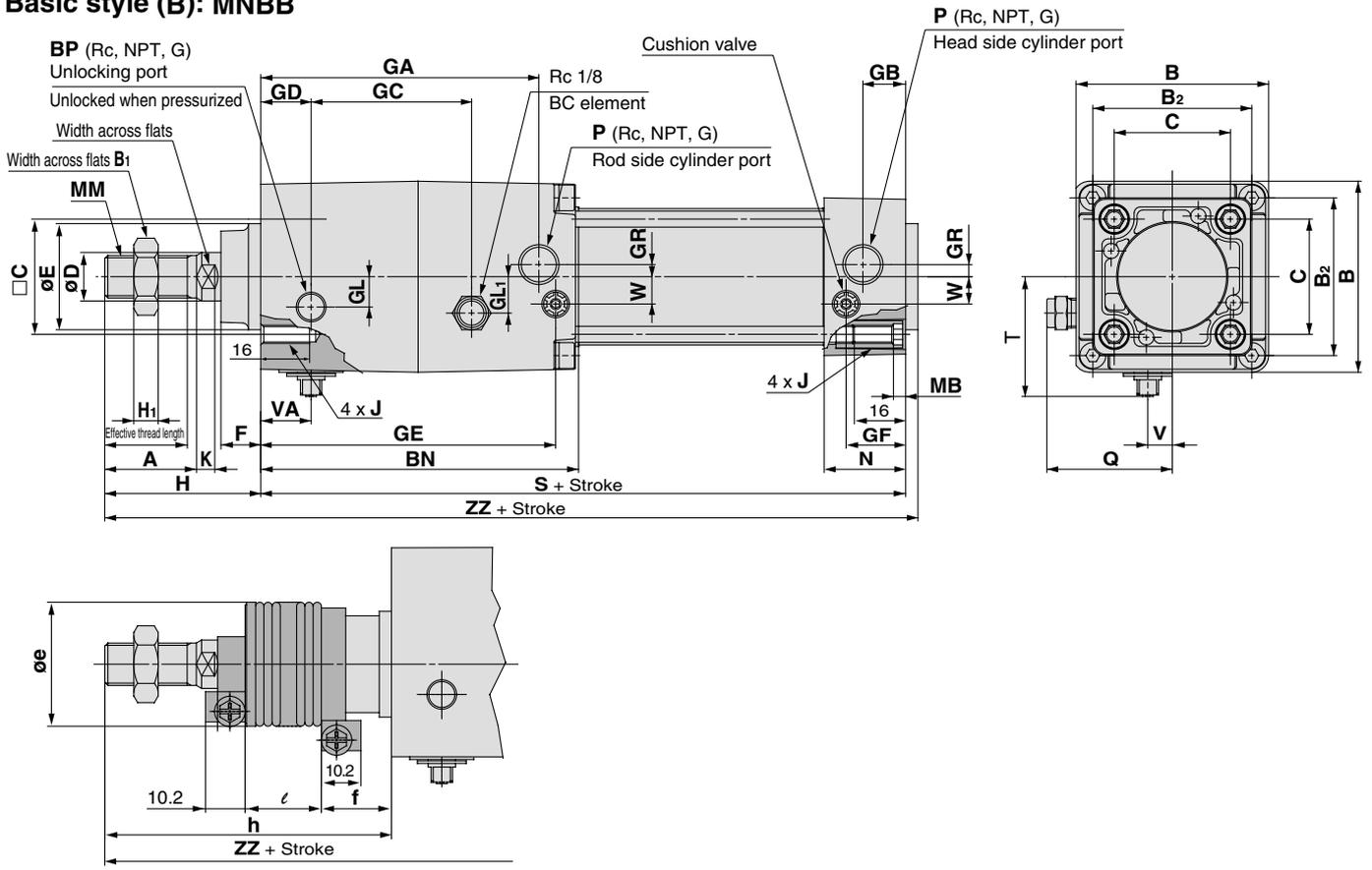
* Since the lock section for Series MNB is normally replaced as a unit, kits are for the cylinder section only. These can be ordered using the order number for each bore size.

* Seal kit includes a grease pack (③2 to ⑤0: 10 g, ⑥3 and ⑧0: 20 g, ⑩00: 30 g). Order with the following part number when only the grease pack is needed.

Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

Dimensions

Basic style (B): MNBB



- CLJ2
- CLM2
- CLG1
- CL1
- MLGC
- CNG
- MNB**
- CNA
- CNS
- CLS
- CLQ
- RLQ
- MLU
- MLGP
- ML1C

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20

Bore size (mm)	GR	GE	GF	J	MB	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	4	88.5	18.3	M6 x 1.0	4	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	205
40	4	96.5	19.5	M6 x 1.0	4	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	216
50	5	111.2	22.4	M8 x 1.25	5	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	245
63	9	123.5	20.7	M8 x 1.25	5	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	259
80	11.5	157	26	M10 x 1.5	5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	321
100	17	177	26	M10 x 1.5	5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	341

With Rod Boot

Bore size (mm)	e	f	ℓ										h									
			1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800
32	36	23	12.5	25	37.5	50	75	100	125	—	—	—	73	86	98	111	136	161	186	—	—	—
40	41	23	12.5	25	37.5	50	75	100	125	—	—	—	81	94	106	119	144	169	194	—	—	—
50	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—
63	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—
80	56	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289
100	61	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289

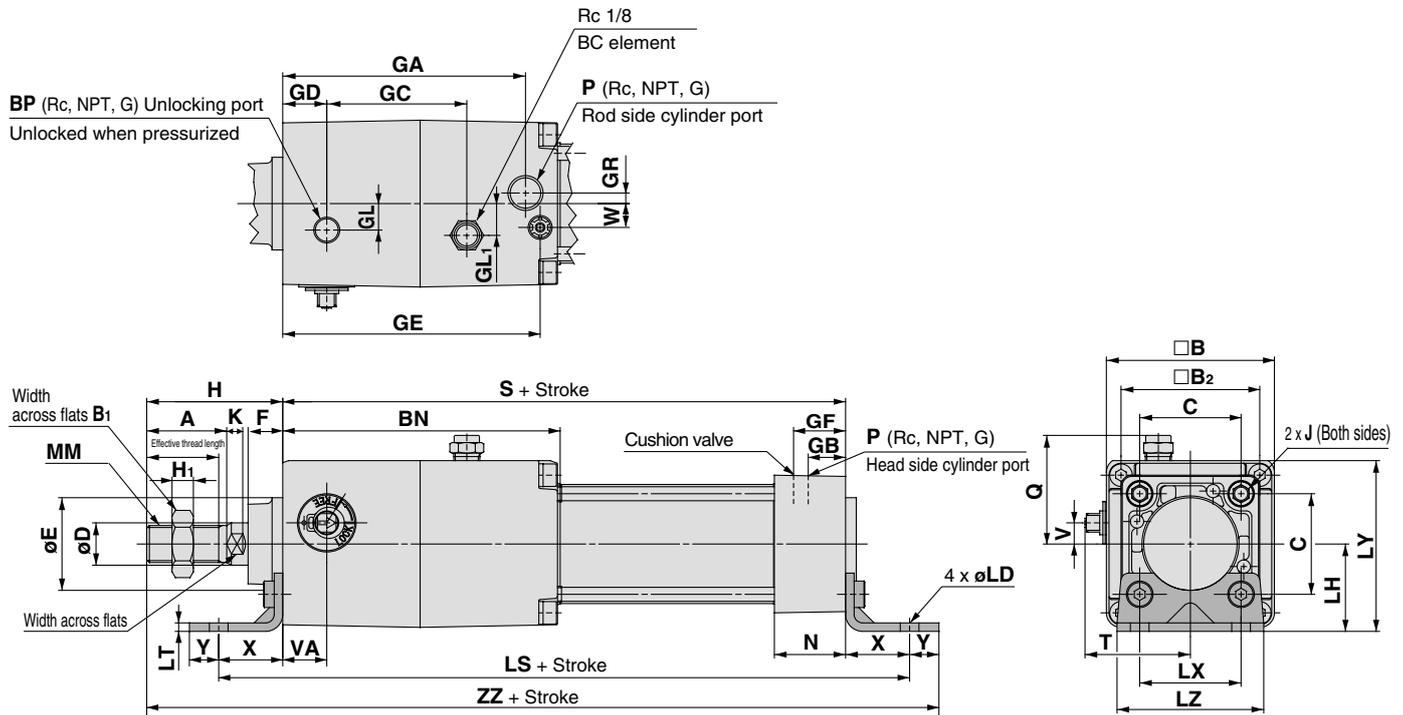
Bore size (mm)	ZZ									
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800
32	231	244	256	269	294	319	344	—	—	—
40	246	259	271	284	309	334	359	—	—	—
50	276	289	301	314	339	364	389	414	—	—
63	290	303	315	328	353	378	403	428	—	—
80	350	363	375	388	413	438	463	488	513	538
100	370	383	395	408	433	458	483	508	533	558

- D-□
- X□
- Individual -X□

Series MNB

Dimensions

Axial foot style (L): MNBL

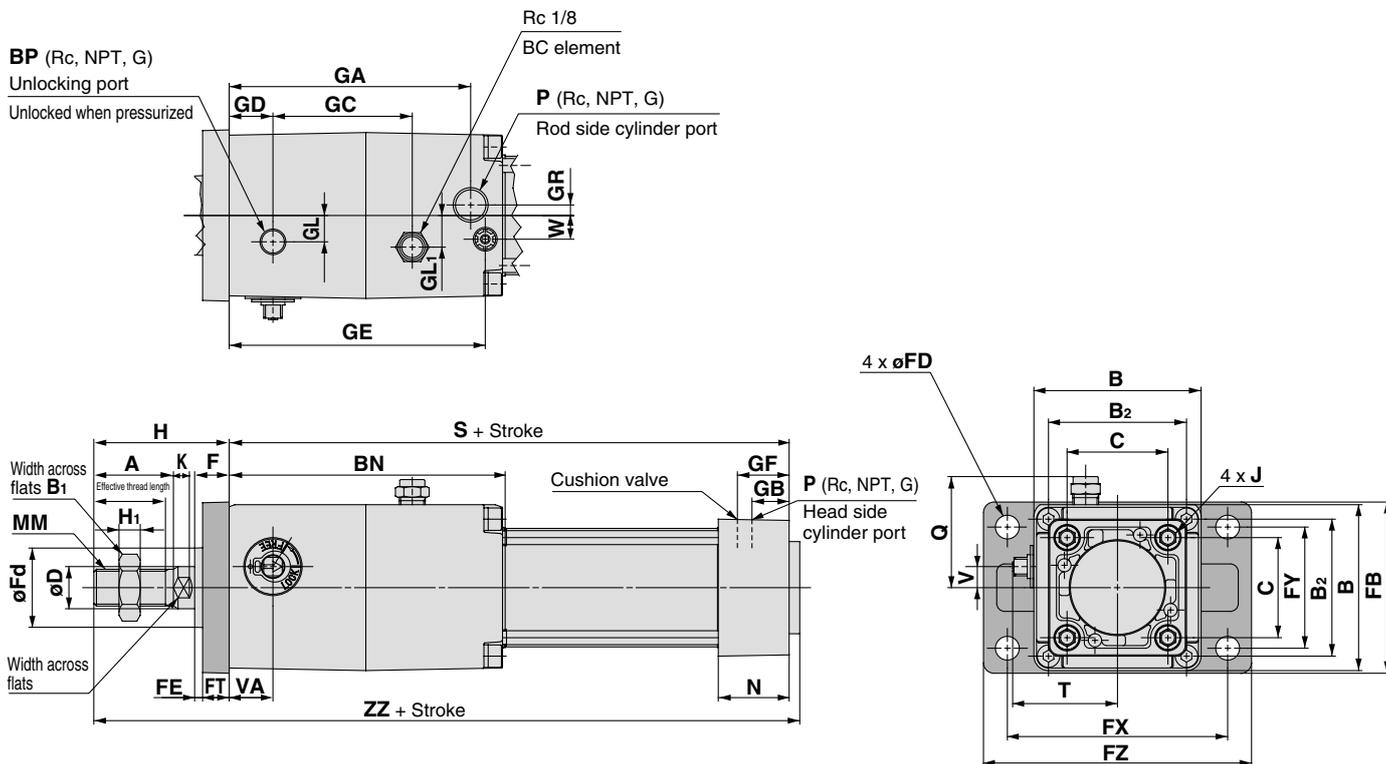


Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁	GR	GE	GF
32	Up to 700	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	Up to 800	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12	4	96.5	19.5
50	Up to 1000	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4
63	Up to 1000	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12	9	123.5	20.7
80	Up to 1000	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18	11.5	157	26
100	Up to 1000	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20	17	177	26

Bore size (mm)	J	LD	LH	LS	LT	LX	LY	LZ	K	MM	N	P	Q	H	S	T	V	VA	W	X	Y	ZZ
32	M6 x 1.0	7	30	198	3.2	32	57	50	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	22	9	232
40	M6 x 1.0	9	33	209	3.2	38	64.5	55	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	24	11	247
50	M8 x 1.25	9	40	237	3.2	46	77.5	70	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	27	11	279
63	M8 x 1.25	12	48	251	3.6	56	93	80	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	27	14	296
80	M10 x 1.5	12	55	305	4.5	72	106	100	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	30	14	361
100	M10 x 1.5	14	65	329	4.5	89	123	120	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	32	16	385

* Refer to page 701 for cylinders with a rod boot.

Rod side flange style (F): MNB



- CLJ2
- CLM2
- CLG1
- CL1
- MLGC
- CNG
- MNB**
- CNA
- CNS
- CLS
- CLQ
- RLQ
- MLU
- MLGP
- ML1C

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	B ₂	BN	BP	C	D	F	F _d	FD	FE	FT	FX	FY	FZ	GA	GB
32	Up to 700	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	13	25	7	3	10	72	38	87	83	13
40	Up to 800	27	14	30	65	63	22	8	52	104	1/8	38	16	13	31	9	3	10	83	46	101	91	14
50	Up to 1000	32	18	35	77	75	27	11	65	120.5	1/4	46.5	20	14	38.5	9	2	12	100	52	120	104.5	15.5
63	Up to 1000	32	18	35	92	90	27	11	75	134.5	1/4	56.5	20	14	39.5	9	2	12	115	62	135	119.5	16.5
80	Up to 1000	37	22	40	100	102	32	13	95	169	1/4	72	25	20	45.5	12	4	16	126	63	153	150	19
100	Up to 1000	37	26	40	120	116	41	16	114	189	1/4	89	30	20	54	14	4	16	150	75	178	170	19

Bore size (mm)	GC	GD	GL	GL ₁	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	45.5	13	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	205
40	52.5	16.5	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	216
50	58.5	19	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	245
63	68	23	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	259
80	81	33	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	321
100	96	37.5	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	341

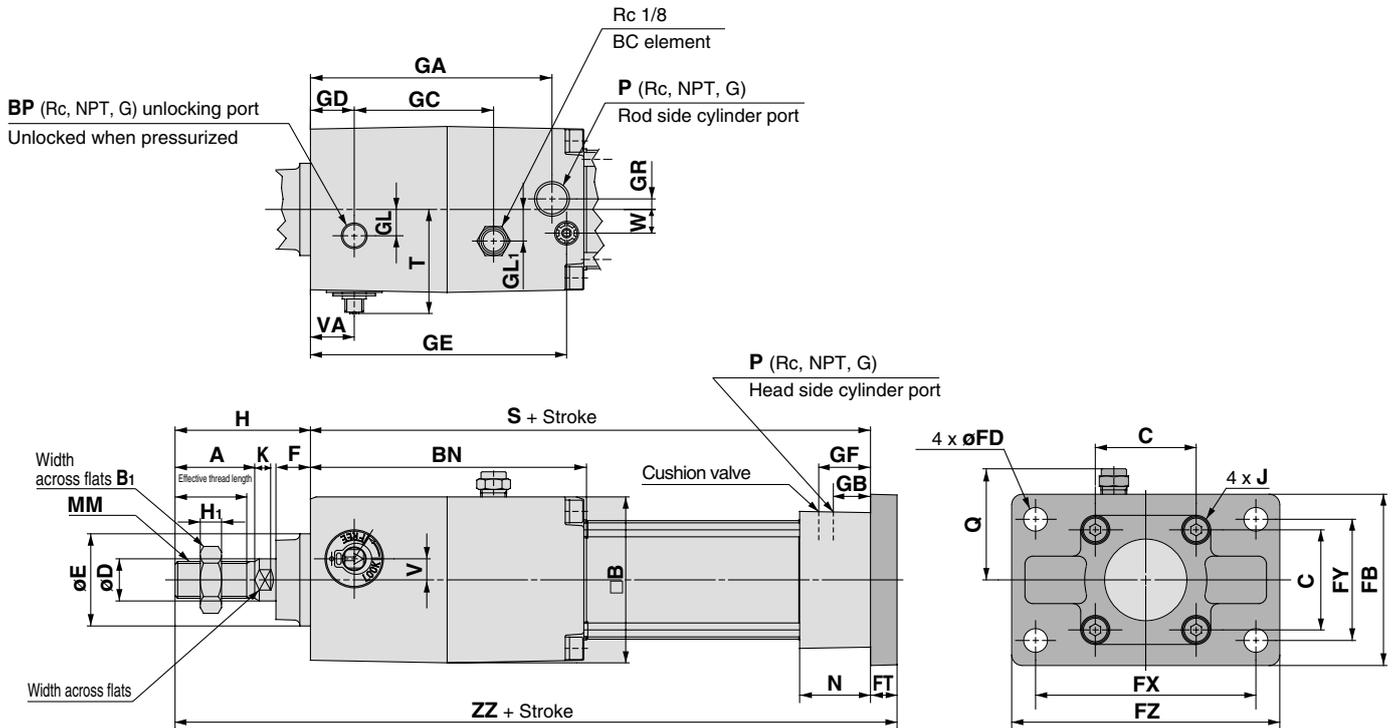
* Refer to page 701 for cylinders with a rod boot.

- D-□
- X□
- Individual -X□

Series MNB

Dimensions

Head side flange style (G): MNBG

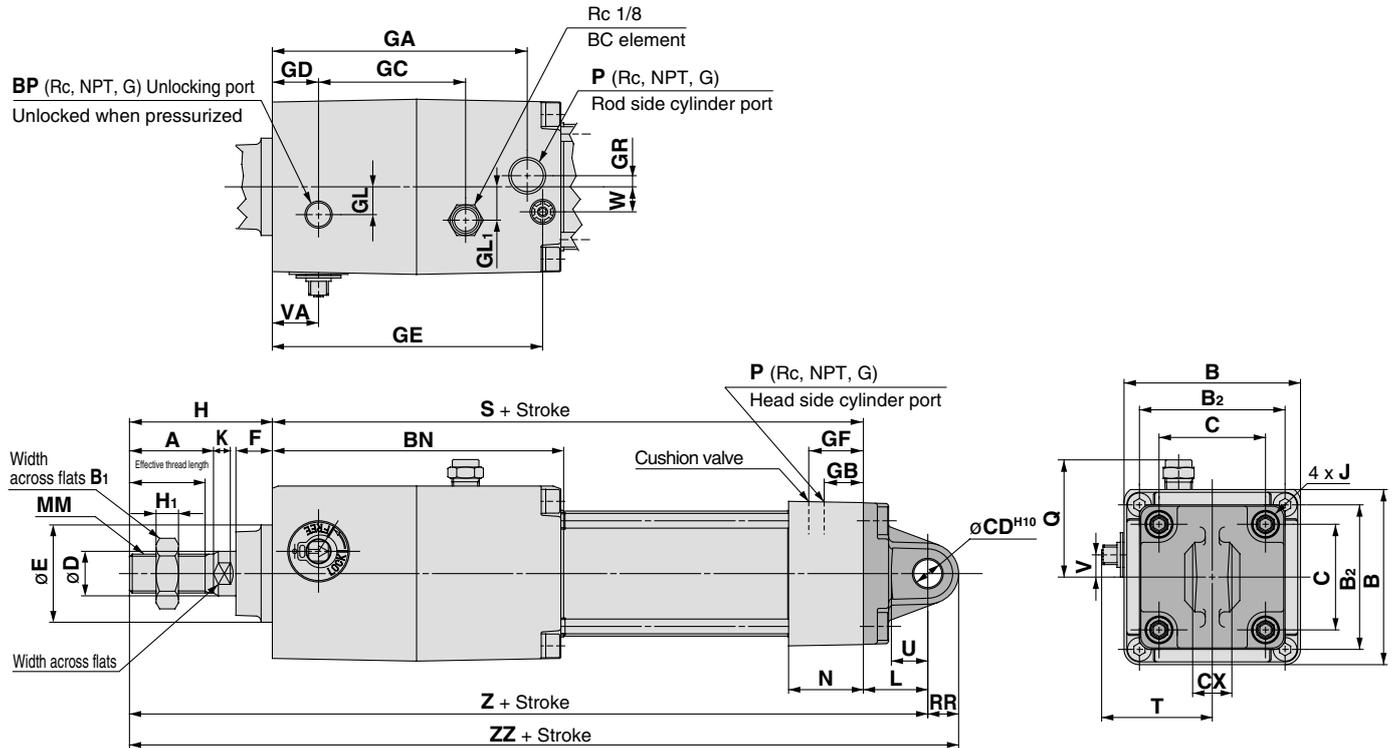


																						(mm)	
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	BN	BP	C	D	Ee ₁₁	F	FD	FT	FX	FY	FZ	GA	GB	GC	GD
32	Up to 500	19.5	10	22	56	54	17	6	97	1/8	32.5	12	30	13	7	10	72	38	87	83	13	45.5	13
40	Up to 500	27	14	30	65	63	22	8	104	1/8	38	16	35	13	9	10	83	46	101	91	14	52.5	16.5
50	Up to 600	32	18	35	77	75	27	11	120.5	1/4	46.5	20	40	14	9	12	100	52	120	104.5	15.5	58.5	19
63	Up to 600	32	18	35	92	90	27	11	134.5	1/4	56.5	20	45	14	9	12	115	62	135	119.5	16.5	68	23
80	Up to 800	37	22	40	100	102	32	13	169	1/4	72	25	45	20	12	16	126	63	153	150	19	81	33
100	Up to 800	37	26	40	120	116	41	16	189	1/4	89	30	55	20	14	16	150	75	178	170	19	96	37.5

Bore size (mm)	GL	GL ₁	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	211
40	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	222
50	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	253
63	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	267
80	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	333
100	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	353

* Refer to page 701 for cylinders with a rod boot.

Single clevis style (C): MNBC



Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	CD ^{H10}	CX ^{-0.1 -0.3}	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁	GR
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	12	30	13	83	13	45.5	13	8.5	12	4
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	16	35	13	91	14	52.5	16.5	10	12	4
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	14	20	20	40	14	104.5	15.5	58.5	19	12.5	15	5
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	14	20	20	45	14	119.5	16.5	68	23	17.5	12	9
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	22	30	25	45	20	150	19	81	33	22	18	11.5
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	22	30	30	55	20	170	19	96	37.5	25	20	17

Bore size (mm)	GE	GF	J	K	L	MM	N	P	Q	RR	H	S	T	U	V	VA	W	Z	ZZ
32	88.5	18.3	M6 x 1.0	6	23	M10 x 1.25	27	1/8	37	10.5	47	154	34	13	6.5	13	6.5	224	234.5
40	96.5	19.5	M6 x 1.0	6	23	M14 x 1.5	27	1/4	41.5	11	51	161	39.5	13	8	16.5	9	235	246
50	111.2	22.4	M8 x 1.25	7	30	M18 x 1.5	31.5	1/4	47.5	15	58	183	47	17	9	20	10.5	271	286
63	123.5	20.7	M8 x 1.25	7	30	M18 x 1.5	31.5	3/8	55	15	58	197	55.5	17	8.5	23	12	285	300
80	157	26	M10 x 1.5	10	42	M22 x 1.5	38	3/8	61	23	72	245	61.5	26	10.5	33	14	359	382
100	177	26	M10 x 1.5	10	42	M26 x 1.5	38	1/2	68	23	72	265	69.5	26	10.5	37.5	15	379	402

* Refer to page 701 for cylinders with a rod boot.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

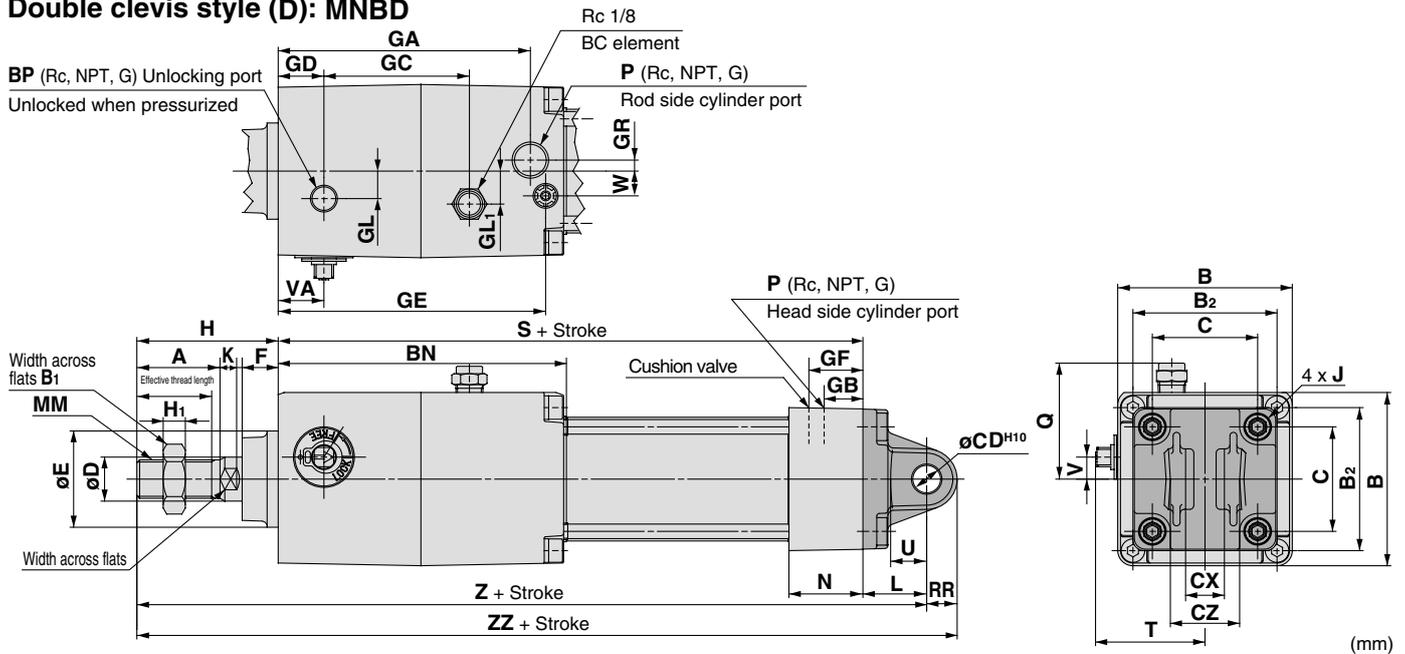
-X□

Individual
-X□

Series MNB

Dimensions

Double clevis style (D): MNBD

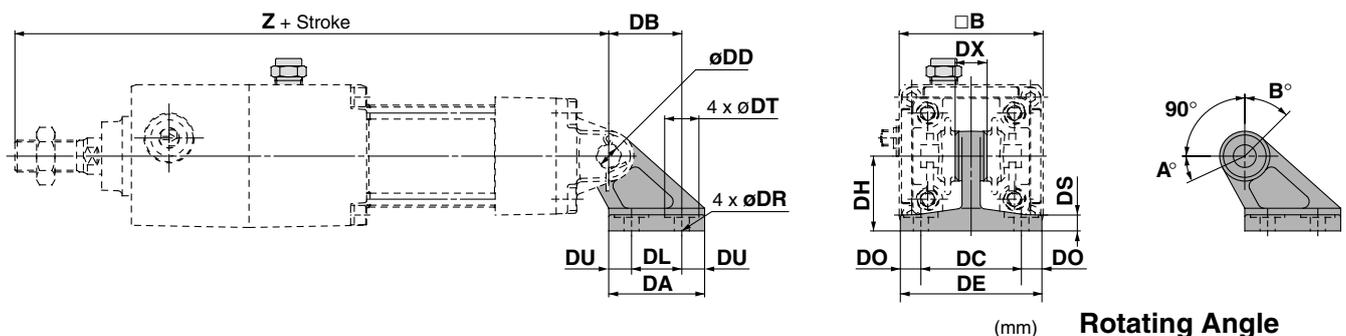


Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	CD ^{H10}	CX ^{+0.3} _{-0.1}	CZ	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	28	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	28	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	14	20	40	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	14	20	40	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	22	30	60	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	22	30	60	30	55	20	170	19	96	37.5	25	20

Bore size (mm)	GR	GE	GF	J	K	L	MM	N	P	Q	RR	H	S	T	U	V	VA	W	Z	ZZ
32	4	88.5	18.3	M6 x 1.0	6	23	M10 x 1.25	27	1/8	37	10.5	47	154	34	13	6.5	13	6.5	224	234.5
40	4	96.5	19.5	M6 x 1.0	6	23	M14 x 1.5	27	1/4	41.5	11	51	161	39.5	13	8	16.5	9	235	246
50	5	111.2	22.4	M8 x 1.25	7	30	M18 x 1.5	31.5	1/4	47.5	15	58	183	47	17	9	20	10.5	271	286
63	9	123.5	20.7	M8 x 1.25	7	30	M18 x 1.5	31.5	3/8	55	15	58	197	55.5	17	8.5	23	12	285	300
80	11.5	157	26	M10 x 1.5	10	42	M22 x 1.5	38	3/8	61	23	72	245	61.5	26	10.5	33	14	359	382
100	17	177	26	M10 x 1.5	10	42	M26 x 1.5	38	1/2	68	23	72	265	69.5	26	10.5	37.5	15	379	402

* Refer to page 701 for cylinders with a rod boot.

Double Clevis Pivot Bracket



Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z	DD _{H10} (Hole)
MB-B03	32	54	42	32	22	10	44	14	62	9	6.6	15	7	33	224	10 ^{+0.058} ₀
	40	63	42	32	22	10	44	14	62	9	6.6	15	7	33	235	10 ^{+0.058} ₀
MB-B05	50	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	271	14 ^{+0.070} ₀
	63	90	53	43	30	11.5	60	20	81	10.5	9	18	8	45	285	14 ^{+0.070} ₀
MB-B08	80	102	73	64	45	14	86	30	111	12.5	11	22	10	65	359	22 ^{+0.084} ₀
	100	116	73	64	45	14	86	30	111	12.5	11	22	10	65	379	22 ^{+0.084} ₀

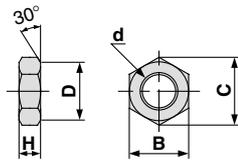
Rotating Angle

Bore size (mm)	A°	B°	A° + B° + 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°

Accessory Bracket Dimensions

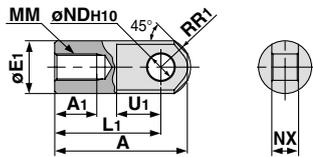
Accessory Bracket Dimensions

Rod End Nut
(Standard equipment)



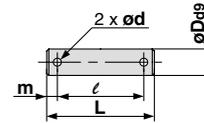
Part no.	Bore size (mm)	B	C	D	H	d
NT-03	32	17	19.6	16.5	6	M10 x 1.25
NT-04	40	22	25.4	21	8	M14 x 1.5
NT-05	50, 63	27	31.2	26	11	M18 x 1.5
NT-08	80	32	37.0	31	13	M22 x 1.5
NT-10	100	41	47.3	39	16	M26 x 1.5

I Type Single Knuckle Joint



Part no.	Bore size (mm)	A	A ₁	E ₁	L ₁	MM	R ₁	U ₁	ND _{H10}	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	10 ^{+0.058} ₀	14 ^{-0.10} _{-0.30}
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	10 ^{+0.058} ₀	14 ^{-0.10} _{-0.30}
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	14 ^{+0.070} ₀	20 ^{-0.10} _{-0.30}
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	22 ^{+0.084} ₀	30 ^{-0.10} _{-0.30}
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	22 ^{+0.084} ₀	30 ^{-0.10} _{-0.30}

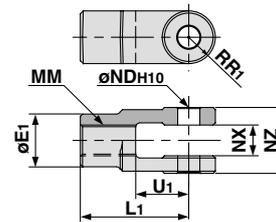
Knuckle Joint Pin,
Clevis Pin



Part no.	Bore size (mm)		D _{ø9}	L	l	m	d (Dill through)	Cotter pin ^{Note)}
	Clevis	Knuckle						
CD-M03	32, 40		10 ^{-0.040} _{-0.076}	44	36	4	3	ø3 x 18 l
CD-M05	50, 63		14 ^{-0.050} _{-0.093}	60	51	4.5	4	ø4 x 25 l
CD-M08	80, 100		22 ^{-0.065} _{-0.117}	82	72	5	4	ø4 x 35 l

Note) Cotter pins and flat washers are included.

Y Type Double Knuckle Joint



Part no.	Bore size (mm)	E ₁	L ₁	MM	R ₁	U ₁	ND _{H10}	NX	NZ
Y-03M	32	20	30	M10 x 1.25	10	16	10 ^{+0.058} ₀	14 ^{+0.30} _{+0.10}	28 ^{-0.10} _{-0.30}
Y-04M	40	22	40	M14 x 1.5	11	19	10 ^{+0.058} ₀	14 ^{+0.30} _{+0.10}	28 ^{-0.10} _{-0.30}
Y-05M	50, 63	28	50	M18 x 1.5	14	24	14 ^{+0.070} ₀	20 ^{+0.30} _{+0.10}	40 ^{-0.10} _{-0.30}
Y-08M	80	40	65	M22 x 1.5	20	34	22 ^{+0.084} ₀	30 ^{+0.30} _{+0.10}	60 ^{-0.10} _{-0.30}
Y-10M	100	40	65	M26 x 1.5	20	34	22 ^{+0.084} ₀	30 ^{+0.30} _{+0.10}	60 ^{-0.10} _{-0.30}

Note) Pin, cotter pin and plain washer are attached with double knuckle joint.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□

Cylinder with Lock

Double Acting, Double Rod

Series *MNBW*

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MNBW L 50 - 100 - D

With auto switch MDNBW L 50 - 100 - D - M9BW

With auto switch (Built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Locking direction

D	Both directions
----------	-----------------

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Auto switch

Nil	Without auto switch
------------	---------------------

With rod boot

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

Cylinder stroke (mm)

Refer to page 709 for the standard stroke.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDNBWL40-100-D

*** For the applicable auto switch model, refer to the table below.**

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC		Tie-rod mounting	Band mounting	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC	
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	—	
				3-wire (PNP)				M9P	—	●	●	●	○	○			
				2-wire				M9B	—	●	●	●	○	○			
		—		J51	—	●	—	●	○	○							
		3-wire (NPN)		—	G39	—	—	—	—	—							
		2-wire		—	K39	—	—	—	—	—							
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	—	●	●	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)				M9PW	—	●	●	●	○	○			
				2-wire				M9BW	—	●	●	●	○	○			
		3-wire (NPN)		M9NA	—	○	○	●	○	○							
		3-wire (PNP)		M9PA	—	○	○	●	○	○							
		2-wire		M9BA	—	○	○	●	○	○							
Water resistant (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NA	—	○	○	●	○	○	IC circuit	—		
			3-wire (PNP)				M9PA	—	○	○	●	○	○				
			2-wire				M9BA	—	○	○	●	○	○				
	With diagnostic output (2-color indication)		4-wire (NPN)	F59F	—	●	—	●	○	○							
	Magnetic field resistant (2-color indication)		2-wire (Non-polar)	P4DW	—	—	—	●	●	○	○						
			—	—	—	—	—	—	—	—	—						
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	12 V	—	A96	—	●	—	●	—	IC circuit	—		
				—				A93	—	●	—	●	—				
				—				A90	—	●	—	●	—				
				—				A54	—	●	—	●	—				
				—				A64	—	●	—	●	—				
		Terminal conduit		Yes	2-wire	—	24 V	12 V	—	—	A33	—	—	—	—	—	Relay, PLC
						—				A34	—	—	—	—			
						—				A34	—	—	—	—			
						—				A44	—	—	—	—			
						—				A59W	—	●	—	●	—		
DIN terminal	Yes	—	—	—	—	—	—	—	—	—	—	—	PLC				
Diagnostic indication (2-color indication)	Grommet	Yes	—	—	—	—	A59W	—	●	—	●	—	—	Relay, PLC			

* Lead wire length symbols: 0.5 m.....Nil (Example) M9NW
 1 m.....M (Example) M9NWM
 3 m.....L (Example) M9NWL
 5 m.....Z (Example) M9NWZ

* Solid state auto switches marked with "○" are produced upon receipt of order.

* Since there are other applicable auto switches than listed, refer to page 717 for details.

* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.

* D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment.)

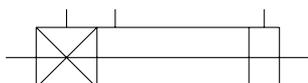
Cylinder with Lock Double Acting, Double Rod **Series MNBW**

Cylinder Specifications



JIS Symbol

Cylinder with brake



Refer to pages 714 to 717 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (Non-lube)					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.08 MPa					
Piston speed	50 to 1000 mm/s *					
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)					
Cushion	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_0$, 251 to 1000: $^{+1.4}_0$					
Mounting	Basic style, Axial foot style, Rod side flange style					

* Load limits exist depending upon piston speed when locked, mounting direction and operating pressure.

Lock Specifications

Bore size (mm)	32	40	50	63	80	100
Locking action	Spring locking (Exhaust locking)					
Unlocking pressure	0.25 MPa or more					
Lock starting pressure	0.20 MPa or less					
Max. operating pressure	1.0 MPa					
Locking direction	Both directions					
Holding force N	552	882	1370	2160	3430	5390

* Be sure to select cylinders in accordance with the procedures on page 694.

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 716).

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

* Intermediate strokes other than the above are produced upon receipt of order. Spacers are not used for intermediate strokes.

Stopping Accuracy

Lock type	Piston speed (mm/s)			
	100	300	500	1000
Spring locking	±0.3	±0.6	±1.0	±2.0

Condition: Lateral, Supply pressure P = 0.5 MPa

Load mass Upper limit of allowed value

Solenoid valve for locking mounted on the unlocking port

Maximum value of stopping position dispersion from 100 measurements

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□

Series **MNBW**

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot ⁽¹⁾	MB-L03	MB-L04	MB-L05	MNB-L*	MB-L08	MB-L10
Flange	MNB-F03*	MNB-F04*	MNB-F05*	MNB-F06*	MB-F08	MB-F10

Note 1) When ordering foot bracket, order 2 pieces per cylinder.

Note 2) Accessories for each mounting bracket are as follows.

Foot, Flange: Body mounting bolts

Note 3) All are common to the MB series air cylinders, except the sections marked with a *.

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C *

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting		Basic style	Foot style	Rod side flange style
Standard equipment	Rod end nut	●	●	●
Option	With rod boot	●	●	●

Double Rod Mass/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic style	1.26	1.82	2.91	4.24	7.23	10.70
	Foot style	1.36	1.94	3.09	4.50	7.66	11.29
	Flange style	1.50	2.14	3.44	4.98	8.68	14.01
Additional mass per each 50 mm of stroke	All mounting brackets	0.15	0.24	0.34	0.35	0.61	0.84
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27

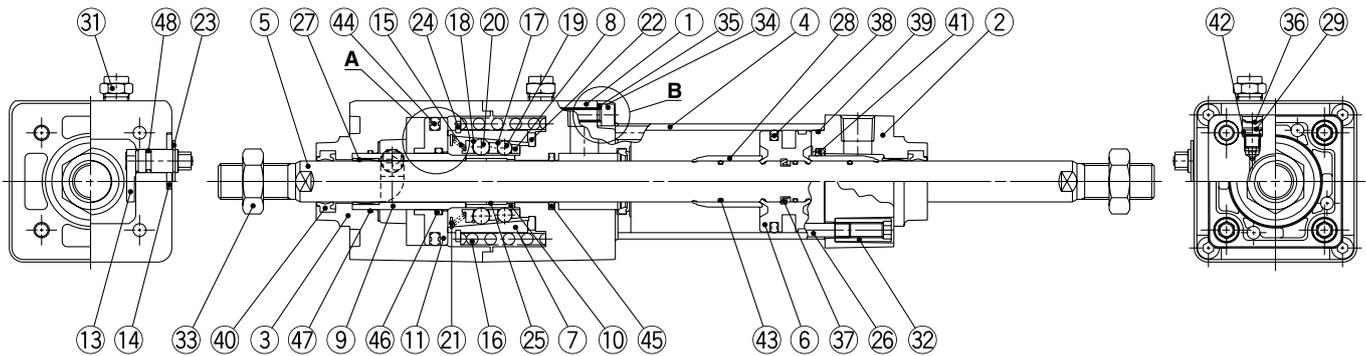
Calculation:

(Example) **MNBWB32-100-D** (Basic type, ø32, 100 st)

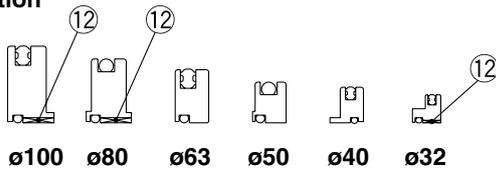
- Basic mass.....1.26 (Basic style, ø32)
- Additional mass0.11/50 stroke
- Cylinder stroke 100 stroke

$$1.26 + 0.11 \times 100/50 = 1.48 \text{ kg}$$

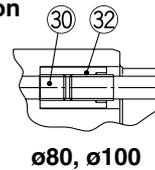
Construction



A section



B section



Component Parts

No.	Description	Material	Note
1	Rod cover A	Aluminum alloy	Hard anodized and metallic painted
2	Rod cover B	Aluminum die-casted	Chromated and metallic painted
3	Cover	Aluminum alloy	Hard anodized and metallic painted
4	Cylinder tube	Aluminum alloy	Hard anodized
5	Piston rod	Carbon steel	Hard chrome plated
6	Piston	Aluminum alloy	Chromated
7	Taper ring	Carbon steel	Heat treated
8	Ball retainer	Special resin	
9	Piston guide	Carbon steel	Zinc chromated
10	Brake shoe holder	Special steel	Heat treated
11	Release piston	Aluminum alloy	ø32, ø80, ø100 Chromated
			ø40, ø50, ø63 Hard anodized
12	Release piston bushing	Steel + Special resin	ø32, ø80, ø100 only
13	Unlocking cam	Chromium molybdenum steel	Glossy chromated
14	Washer	Carbon steel	Colorless zinc chromated
15	Retainer pre-load spring	ø32	Steel wire Zinc chromated
		ø40 to ø100	Stainless steel wire
16	Brake spring	Steel wire	
17	Clip A	Stainless steel	Zinc chromated
18	Clip B	Stainless steel	
19	Steel ball A	Carbon steel	
20	Steel ball B	Carbon steel	
21	Tooth ring	Stainless steel	
22	Bumper	Polyurethane rubber	
23	Type C retaining ring for unlocking cam shaft	Carbon steel	
24	Type C retaining ring for taper ring	Carbon steel	
25	Brake shoe	Babbitt	
26	Tie-rod	Carbon steel	Zinc chromated
27	Bushing	Copper alloy	
28	Cushion ring	Brass	

Component Parts

No.	Description	Material	Note
29	Cushion valve	Steel wire	Nickel plated
30	Unit holding tie-rod	Carbon steel	Chromated ø80, ø100 only
31	BC element		
32	Tie-rod nut	Carbon steel	Nickel plated
33	Rod end nut	Carbon steel	Nickel plated
34	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated ø32 to ø63
35	Spring washer for hex. socket head cap screw	Steel wire	Nickel plated ø32 to ø63
36	Retaining ring	Spring steel	
37	Piston holder	Urethane	
38	Piston seal	NBR	
39	Cylinder tube gasket	NBR	
40	Rod seal A	NBR	
41	Cushion seal	NBR	
42	Cushion valve seal	NBR	
43	Piston gasket	NBR	
44	Release piston seal	NBR	
45	Rod seal B	NBR	
46	Release piston gasket	NBR	
47	Piston guide gasket	NBR	
48	Unlocking cam gasket	NBR	

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBW32-PS	A set of 38, 39, 40 and 41 above
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	

* As a general rule, the lock section of Series MNBW is replaced as a unit, and therefore, the replacement seal kits are for the cylinder section only. These can be ordered using the order number for each bore size.
* Seal kit includes a grease pack (ø32 to ø50: 10 g, ø63 and ø80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-

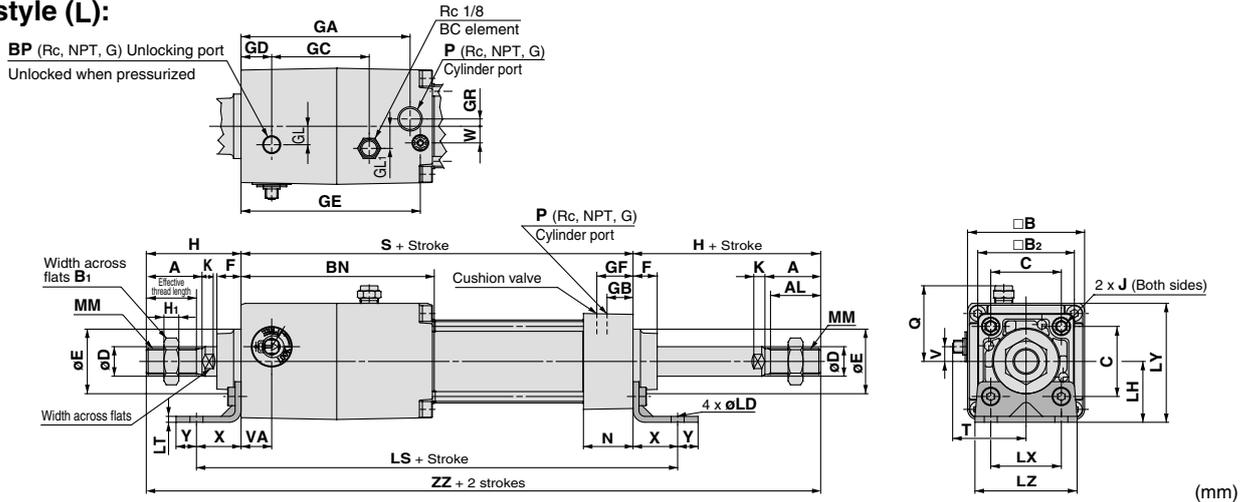
-X

Individual
-X

Dimensions

Axial foot style (L):

MNBWL



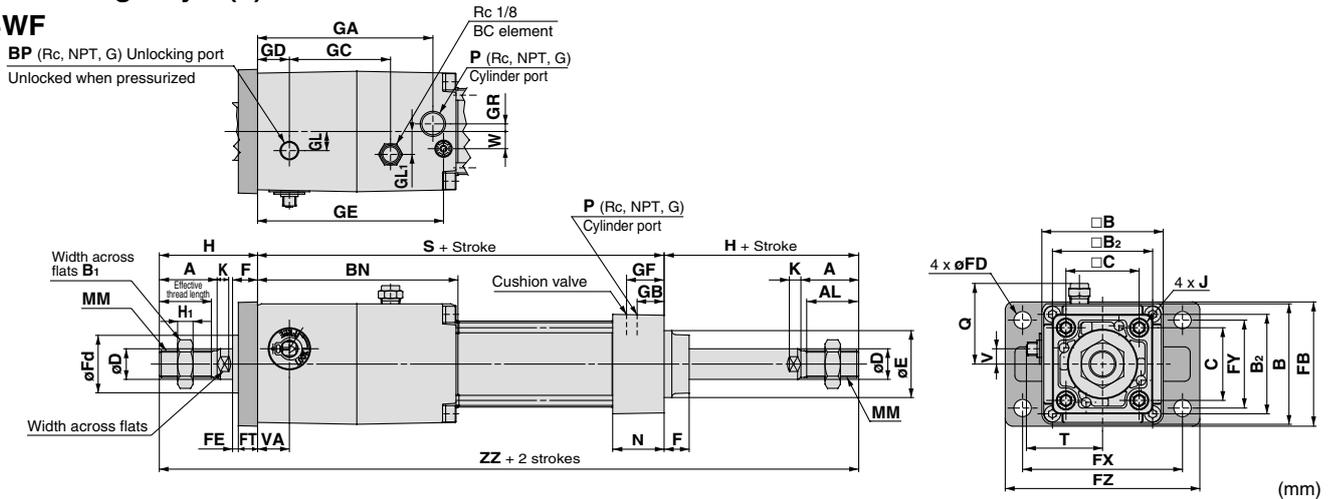
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁	GR	GE	GF
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12	4	96.5	19.5
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12	9	123.5	20.7
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18	11.5	157	26
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20	17	177	26

Bore size (mm)	J	LD	LH	LS	LT	LX	LY	LZ	K	MM	N	P	Q	H	S	T	V	VA	W	X	Y	ZZ
32	M6 x 1.0	7	30	198	3.2	32	57	50	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	22	9	248
40	M6 x 1.0	9	33	209	3.2	38	64.5	55	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	24	11	263
50	M8 x 1.25	9	40	237	3.2	46	77.5	70	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	27	11	299
63	M8 x 1.25	12	48	251	3.6	56	93	80	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	27	14	313
80	M10 x 1.5	12	55	305	4.5	72	106	100	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	30	14	389
100	M10 x 1.5	14	65	329	4.5	89	123	120	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	32	16	409

* Refer to page 712 for cylinders with a rod boot.

Rod side flange style (F):

MNBWF



Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	B ₂	BN	BP	C	D	Ee ₁₁	F	Fd	FD	FE	FT	FX	FY	FZ
32	Up to 500	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	30	13	25	7	3	10	72	38	87
40	Up to 500	27	14	30	65	63	22	8	52	104	1/8	38	16	35	13	31	9	3	10	83	46	101
50	Up to 600	32	18	35	77	75	27	11	65	120.5	1/4	46.5	20	40	14	38.5	9	2	12	100	52	120
63	Up to 600	32	18	35	92	90	27	11	75	134.5	1/4	56.5	20	45	14	39.5	9	2	12	115	62	135
80	Up to 800	37	22	40	100	102	32	13	95	169	1/4	72	25	45	20	45.5	12	4	16	126	63	153
100	Up to 800	37	26	40	120	116	41	16	114	189	1/4	89	30	55	20	54	14	4	16	150	75	178

Bore size (mm)	GA	GB	GC	GD	GL	GL ₁	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	83	13	45.5	13	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	248
40	91	14	52.5	16.5	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	263
50	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	299
63	119.5	16.5	68	23	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	313
80	150	19	81	33	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	389
100	170	19	96	37.5	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	409

* Refer to page 712 for cylinders with a rod boot.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

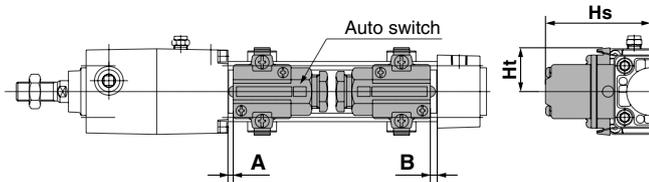
Individual
-X□

Series MNB

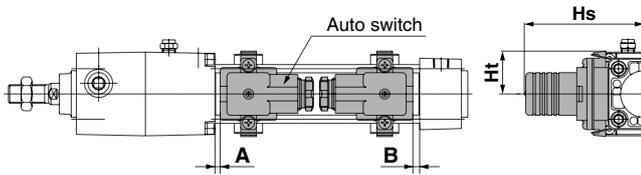
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

<Band mounting style>

D-A3□/G39/K39



D-A44



<Tie-rod mounting style>

D-A9□/A9□V

D-M9□/M9□V

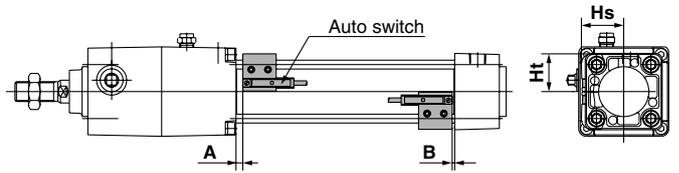
D-M9□W/M9□WV

D-M9□AL/M9□AVL

D-Z7□/Z80

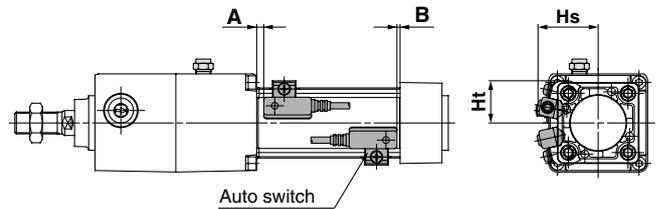
D-Y59/Y69/Y7P/Y7PV

D-Y7□W/Y7□WV/Y7BAL



D-A5□/A6□

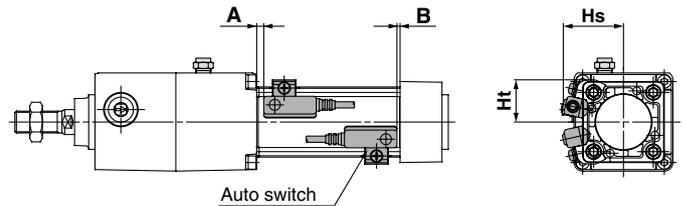
D-A59W



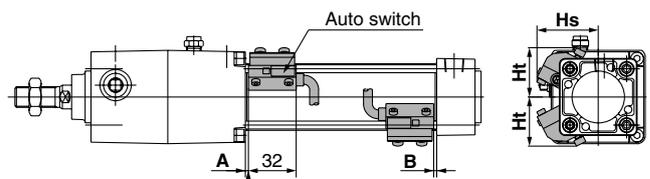
D-F5□/J5□

D-F5□W/J59W/F5BAL

D-F59F/F5NTL



D-P4DWL



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Auto Switch Proper Mounting Position

(mm)

Auto switch model	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-A5□ D-A6□		D-A59W		D-F5□W D-J59W D-F5□ D-J5□ D-F5BAL D-F59F		D-F5NTL		D-A3□ D-A44 D-G39 D-K39		D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BAL		D-P4DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
40	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
50	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
63	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
80	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5
100	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

(mm)

Auto switch model	D-A9□ D-M9□ D-M9□W D-M9□AL		D-A9□V		D-M9□V D-M9□WV D-M9□AVL		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F59F D-F5□W D-J59W D-F5BAL D-F5NTL		D-A3□ D-G39 D-K39		D-A44		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W D-Y7BAL		D-Y69□ D-Y7PV D-Y7□WV		D-P4DWL	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	27.5	23	30.5	23	35	24.5	32.5	25	67	27.5	77	27.5	25.5	23	26.5	23	38	31
40	28.5	25.5	31.5	25.5	34	25.5	38.5	27.5	36.5	27.5	71.5	27.5	81.5	27.5	29.5	26	30	26	42	33
50	33.5	31	36	31	38.5	31	43.5	34.5	41	34	77	—	87	—	33.5	31	34.5	31	46.5	39
63	38.5	36	40.5	36	43	36	48.5	39.5	46	39	83.5	—	93.5	—	39	36	40	36	51.5	44
80	46.5	45	49	45	52	45	55	46.5	52.5	46.5	92.5	—	103	—	47.5	45	48.5	45	58	51.5
100	54	53.5	57	53.5	59.5	53.5	62	55	59.5	55	103	—	113.5	—	55.5	53.5	56.5	53.5	65.5	60.5

Operating Range

(mm)

Auto switch model	Bore size (mm)					
	32	40	50	63	80	100
D-A9□/A9□V	7	7.5	8.5	9.5	9.5	10.5
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	4	4.5	5	6	6	6
D-Z7□/Z80	7.5	8.5	7.5	9.5	9.5	10.5
D-A5□/A6□	9	9	10	11	11	11
D-A59W	13	13	13	14	14	15
D-A3□/A44	9	9	10	11	11	11
D-Y59□/Y69□ D-Y7P/Y7□V D-Y7□W/Y7□WV D-Y7BAL	5.5	5.5	7	7.5	6.5	5.5
D-F5□/J5□ D-F5□W/J59W D-F5BAL/F5NTL D-F59F	3.5	4	4	4.5	4.5	4.5
D-G39/K39	9	9	10	11	11	11
D-P4DWL	4	4	4	4.5	4	4.5

* Since this is a guideline including hysteresis, not meant to be guaranteed.
(Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□

Series MNB

Minimum Stroke for Auto Switch Mounting

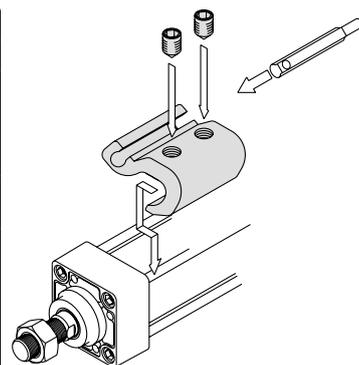
n: No. of auto switches (mm)

Auto switch model	No. of auto switches mounted	ø32, ø40, ø50, ø63	ø80, ø100
D-A9 □	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	
D-A9 □V	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-M9 □ D-M9 □W D-M9 □AL	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-M9 □V D-M9 □WV D-M9 □AVL	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-A3 □ D-G39 D-K39	2 (Different surfaces)	35	
	2 (Same surface)	100	
	n (Different surfaces)	$35 + 30 (n-2)$ (n = 2, 3, 4...)	
	n (Same surface)	$100 + 100 (n-2)$ (n = 2, 3, 4...)	
	1	10	
D-A44	2 (Different surfaces)	35	
	2 (Same surface)	55	
	n (Different surfaces)	$35 + 30 (n-2)$ (n = 2, 3, 4...)	
	n (Same surface)	$55 + 50 (n-2)$ (n = 2, 3, 4...)	
	1	10	

Auto switch model	No. of auto switches mounted	ø32, ø40, ø50, ø63	ø80, ø100
D-A5 □ D-A6 □	2 (Different surfaces, same surface), 1	15	20
	n (Same surface)	$15 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	$20 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)
D-A59W	2 (Different surfaces, same surface)	20	25
	n (Same surface)	$20 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)
	1	15	25
D-F5 □/J5□ D-F5 □W D-J59W D-F5BAL D-F59F D-F5NTL	2 (Different surfaces, same surface)	15	25
	n (Same surface)	$15 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	$25 + 55 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)
	1	10	25
D-Z7 □ D-Z80 D-Y59 □ D-Y7P D-Y7 □W	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-Y69 □ D-Y7PV D-Y7 □WV	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-Y7BAL	2 (Different surfaces, same surface), 1	20	
	n	$20 + 45 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	
D-P4DWL	2 (Different surfaces, same surface), 1	15	
	n	$15 + 65 \frac{(n-2)}{2}$ (n=2, 4, 6, 8...)	

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)					
	ø32	ø40	ø50	ø63	ø80	ø100
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063
D-A3□/A44 D-G39/K39	BMB2-032	BMB2-040	BMB1-050	BMB1-063	BMB1-080	BMB1-100
D-A5□/A6□ D-A59W D-F5□/J5□ D-F5□W/J59W D-F5□F D-F5BAL D-F5NTL	BT-03	BT-03	BT-05	BT-05	BT-06	BT-06
D-P4DWL	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BAL	BMB4-032	BMB4-032	BMB4-050	BMB4-050	BA4-063	BA4-063



• The above figure shows the mounting example of D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V)L.

[Mounting screws set made of stainless steel]

The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)

- BBA1: For D-A5/A6/F5/J5 types
- D-F5BAL auto switch is set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA1 is attached.
- Note 1) Refer to page 1821 for the details of BBA1.
- Note 2) When using D-M9□A(V)L/Y7BAL, do not use the steel set screws which is included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 6L stainless steel set screws included in the BBA1.

- CLJ2
- CLM2
- CLG1
- CL1
- MLGC
- CNG
- MNB**
- CNA
- CNS
- CLS
- CLQ
- RLQ
- MLU
- MLGP
- ML1C

Besides the models listed in How to Order, the following auto switches are applicable.
For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Fetching direction)	Features	
Reed	D-A93V, A96V	Grommet (Perpendicular)	—	
	D-A90V		Without indicator light	
	D-A53, A56, Z73, Z76	Grommet (In-line)	—	
	D-A67, Z80		Without indicator light	
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	—	
	D-Y69A, Y69B, Y7PV		Diagnostic indication (2-color indication)	
	D-M9NWV, M9PWV, M9BWV			Water resistant (2-color indication)
	D-Y7NWV, Y7PWV, Y7BWV		Grommet (In-line)	
	D-M9NAVL, M9PAVL, M9BAVL			—
	D-F59, F5P, J59			Diagnostic indication (2-color indication)
	D-Y59A, Y59B, Y7P	Water resistant (2-color indication)		
	D-F59W, F5PW, J59W			
	D-Y7NW, Y7PW, Y7BW	Magnetic field resistant (2-color indication)		
	D-F5BAL, Y7BAL		—	
	D-F5NTL	—		
	D-P5DWL	—		

* With pre-wired connector is available for solid state auto switches. For details, refer to pages 1784 and 1785.
* Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1746 and 1748.

- D-□
- X□
- Individual -X□



Series MNB Specific Product Precautions 1

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Design of Equipment and Machinery

Warning

1. Construct so that the human body will not come into direct contact with driven objects or the moving parts of the cylinders with lock.

Devise a safe structure by attaching protective covers that prevent direct contact with the human body, or in cases where there is a danger of contact, provide sensors or other devices to perform an emergency stop, etc., before contact occurs.

2. Use a balance circuit, taking cylinder lurching into consideration.

In cases such as an intermediate stop, where a lock is operated at a desired position within the stroke and air pressure is applied from only one side of the cylinder, the piston will lurch at high speed when the lock is released. In such situations, there is a danger of causing human injury by having hands or feet, etc. caught, and also a danger for causing damage to the equipment. In order to prevent this lurching, a balance circuit such as the recommended pneumatic circuits (page 719) should be used.

Selection

Warning

1. When in the locked state, do not apply a load accompanied by an impact shock, strong vibration or turning force, etc.

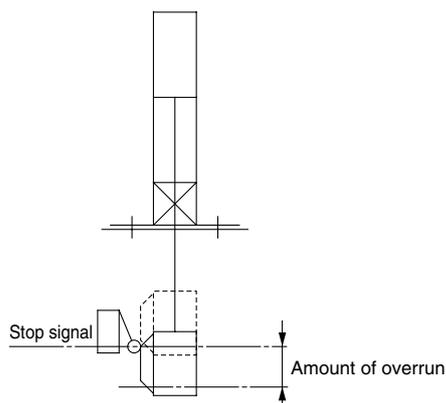
Use caution, because an external action such as an impacting load, strong vibration or turning force, may damage the locking mechanism or reduce its life.

2. Consider stopping accuracy and the amount of over-run when an intermediate stop is performed.

Due to the nature of a mechanical lock, there is a momentary lag with respect to the stop signal, and a time delay occurs before stopping. The cylinder stroke resulting from this delay is the overrun amount. The difference between the maximum and minimum overrun amounts is the stopping accuracy.

- Place a limit switch before the desired stopping position, at a distance equal to the overrun amount.
- The limit switch must have a detection length (dog length) of the overrun amount + α .
- SMC's auto switches have operating ranges from 8 to 14 mm (depending on the switch model).
When the overrun amount exceeds this range, self-holding of the contact should be performed at the switch load side.

* For stopping accuracy, refer to page 697.



Selection

Warning

3. In order to further improve stopping accuracy, the time from the stop signal to the operation of the lock should be shortened as much as possible.

To accomplish this, use a device such as a highly responsive electric control circuit or solenoid valve driven by direct current, and place the solenoid valve as close as possible to the cylinder.

4. Note that the stopping accuracy will be influenced by changes in piston speed.

When piston speed changes during the course of the cylinder stroke due to variations in the load or disturbances, etc., the dispersion of stopping positions will increase. Therefore, consideration should be given to establishing a standard speed for the piston just before it reaches the stopping position.

Moreover, the dispersion of stopping positions will increase during the cushioned portion of the stroke and during the accelerating portion of the stroke after the start of operation, due to the large changes in piston speed.

5. The holding force (max. static load) indicates the maximum capability to hold a static load without loads, vibration and impact. This does not indicate a load that can be held in ordinary conditions.

Select the most suitable bore sizes for the operating conditions in accordance with the selection procedures. The Model Selection (pages 694 and 695) is based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) on page 695 depending on the operating pressure and select models.

Mounting

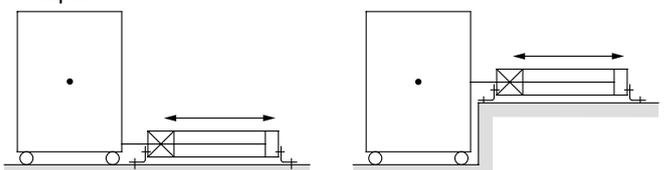
Warning

1. Be certain to connect the rod end to the load with the lock released.

If connected in the locked state, a load greater than the turning force or holding force, etc. may operate on the piston rod and cause damage to the lock mechanism. Series MNB is equipped with an emergency unlocking mechanism, however, when connecting the rod end to the load, this should be done with the lock released. This can be accomplished by simply connecting an air line to the unlocking port and supplying air pressure of 0.25 MPa or more.

2. Do not apply offset loads to the piston rod.

Particular care should be taken to match the load's center of gravity with the center of the cylinder shaft. When there is a large discrepancy, the piston rod may be subjected to uneven wear or damage due to the inertial moment during locking stops.



Note) Can be used if all of the generated moment is absorbed by an effective guide.



Series MNB Specific Product Precautions 2

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Mounting

⚠ Caution

1. Use the hexagon wrenches shown below when replacing brackets.

Bore size (mm)	Bolt	Width across flats	Tightening torque (N·m)
32, 40	MB-32-48-C1247	4	5.1
50, 63	MB-50-48-C1249	5	11
80, 100	Foot	6	25
	Others		

2. When replacing the head side bracket, the tie-rod nut on the cylinder body also loosens. After retightening the tie-rod nut at the proper tightening torque (Refer to Adjustment 1. below.), install the bracket.
3. Mounting between air cylinder Series CA1 and cylinder with lock Series CNA has no interchangeability.

Adjustment

⚠ Warning

1. Do not open the cushion valve beyond the stopper. As a retaining mechanism for the cushion valve, a crimped section (ø32 head cover) or retaining ring is installed (ø40 to ø100), and the cushion valve should not be opened beyond that point. If not operated in accordance with the above precautions, the cushion valve may be ejected from the cover when air pressure is supplied.

Bore size (mm)	Cushion valve	Hexagon wrench
32, 40	2.5	JIS 4648 Hexagon wrench key 2.5
50, 63	3.0	JIS 4648 Hexagon wrench key 3
80, 100	4.0	JIS 4648 Hexagon wrench key 4

2. Use the air cushion at the end of cylinder stroke. If this is not done, the tie-rod or piston assembly will be damaged.

⚠ Caution

1. Adjust the cylinder's air balance. Balance the load by adjusting the air pressure in the rod and head sides of the cylinder with the load connected to the cylinder and the lock released. Lurching of the cylinder when unlocked can be prevented by carefully adjusting this air balance.
2. Adjust the mounting positions of the detectors on auto switches, etc. When intermediate stops are to be performed, adjust the mounting positions of detectors on auto switches, etc., taking into consideration the overrun amount with respect to the desired stopping positions.

Pneumatic Circuit

⚠ Warning

1. Be certain to use an pneumatic circuit which will apply balancing pressure to both sides of the piston when in a locked stop.

In order to prevent cylinder lurching after a lock stop, when restarting or when manually unlocking, a circuit should be used to which will apply balancing pressure to both sides of the piston, thereby canceling the force generated by the load in the direction of piston movement.

2. Use a solenoid valve for unlocking which has a large effective area, as a rule 50% or more of the effective area of the cylinder drive solenoid valve.

The larger the effective area is, the shorter the locking time will be (the overrun amount will be shorter), and stopping accuracy will be improved.

3. Place the solenoid valve for unlocking close to the cylinder, and no farther than the cylinder drive solenoid valve.

The shorter the distance from the cylinder (the shorter the piping), the shorter the overrun amount will be, and stopping accuracy will be improved.

4. Allow at least 0.5 seconds from a locked stop (intermediate stop of the cylinder) until release of the lock.

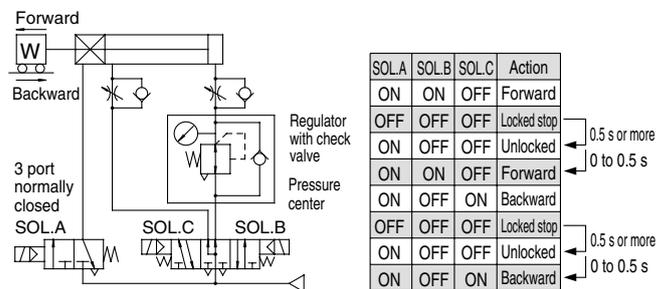
When the locked stop time is too short, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

5. When restarting, control the switching signal for the unlocking solenoid valve so that it acts before or at the same time as the cylinder drive solenoid valve.

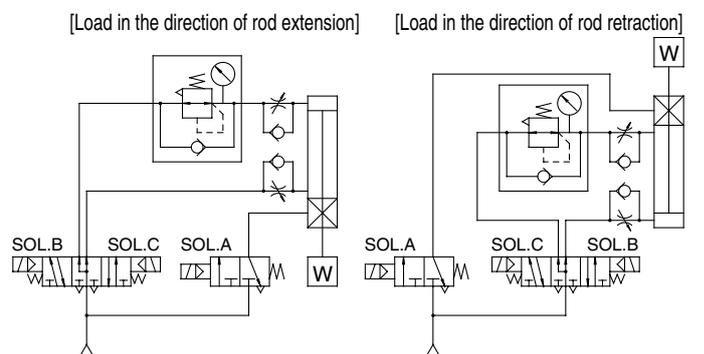
If the signal is delayed, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

6. Basic circuit

- 1) [Horizontal]



- 2) [Vertical]



CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual

-X□



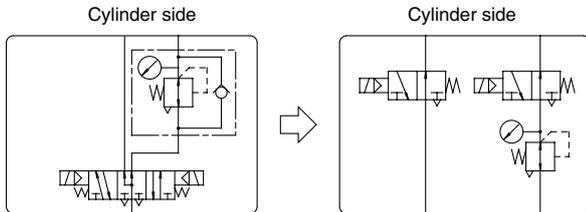
Series MNB Specific Product Precautions 3

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Pneumatic Circuit

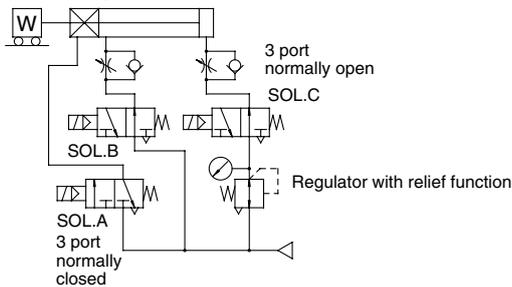
Caution

- 3 position pressure center solenoid valve and regulator with check valve can be replaced with two 3 port normally open valves and a regulator with relief function.



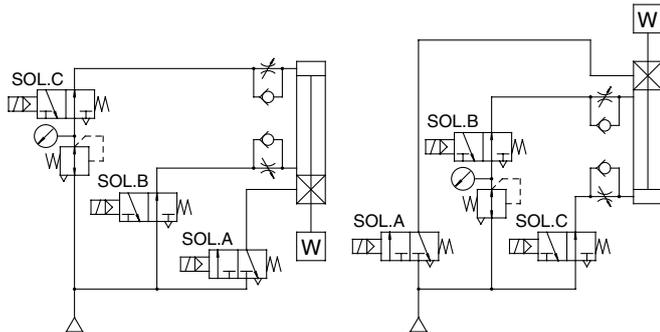
[Example]

- [Horizontal]



- [Vertical]

[Load in the direction of rod extension] [Load in the direction of rod retraction]



Manually Unlocking

Warning

- Never operate the unlocking cam until safety has been confirmed. (Do not turn to the FREE side.)
 - When unlocking is performed with air pressure applied to only one side of the cylinder, the moving parts of the cylinder will lurch at high speed causing a serious hazard.
 - When unlocking is performed, be sure to confirm that personnel are not within the load movement range and that no other problems will occur if the load moves.
- Before operating the unlocking cam, exhaust any residual pressure which is in the system.
- Take measures to prevent the load from dropping when unlocking is performed.
 - Perform work with the load in its lowest position.
 - Take measures for drop prevention by strut, etc.

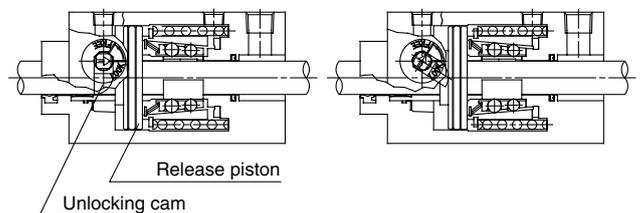
Manually Unlocking

Caution

- The unlocking cam is an emergency unlocking mechanism only.
 - During an emergency when the air supply is stopped or cut off, this is used to alleviate a problem by forcibly pushing back the release piston and brake spring to release the lock.
- When installing the cylinder into equipment or performing adjustments, etc., be sure to apply air pressure of 0.25 MPa or more to the unlocking port, and do not perform work using the unlocking cam.
- When releasing the lock with the unlocking cam, it must be noted that the internal resistance of the cylinder will be high, unlike normally unlocking with air pressure.

Bore size (mm)	Cylinder internal resistance (N)	Cam unlocking torque (standard) (N·m)	Width across flats (mm)
32	69	2.0	5.5
40	108	5.9	7
50	275	11.8	8
63	432	12.8	10
80	686	20.6	10
100	765	23.5	12

- Do not turn the unlocking cam (the arrow or mark on the unlocking cam head) past the position marked FREE. If it is turned too far there is a danger of damaging the unlocking cam.
- For safety reasons, the unlocking cam is constructed so that it cannot be fixed in the unlocked condition.



Locked state

Manually unlocked state

[Principle]

If the unlocking cam is turned counterclockwise with a tool such as an adjustable angle wrench, the release piston is pushed back and the lock is released. Since the lever will return to its original position when released and become locked again, it should be held in this position for as long as unlocking is needed.



Series MNB Specific Product Precautions 4

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Maintenance

Caution

1. The lock units for Series MNB are replaceable.

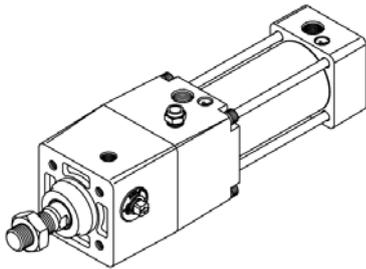
To order replacement lock units for Series MNB, use the order numbers given in the table below.

Bore size (mm)	Lock unit part no.
32	MNB 32D-UA
40	MNB 40D-UA
50	MNB 50D-UA
63	MNB 63D-UA
80	MNB 80D-UA
100	MNB100D-UA

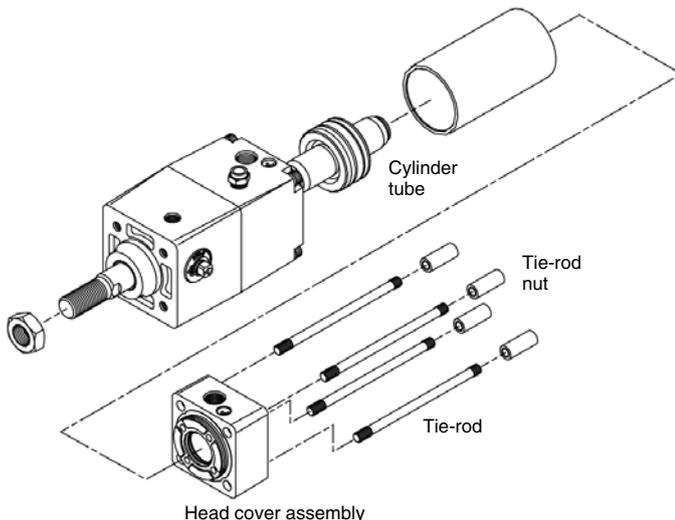
2. How to replace lock unit

- Loosen the tie-rod nuts (4 pcs.) on the cylinder head cover side by using a hexagon wrench.
For the applicable hexagon wrench, refer to the table below.

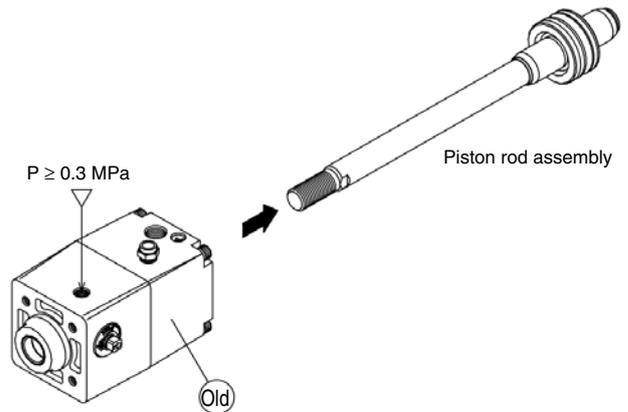
Bore size (mm)	Tie-rod nut socket width across flats (mm)
32, 40	6
50, 63	8
80, 100	10



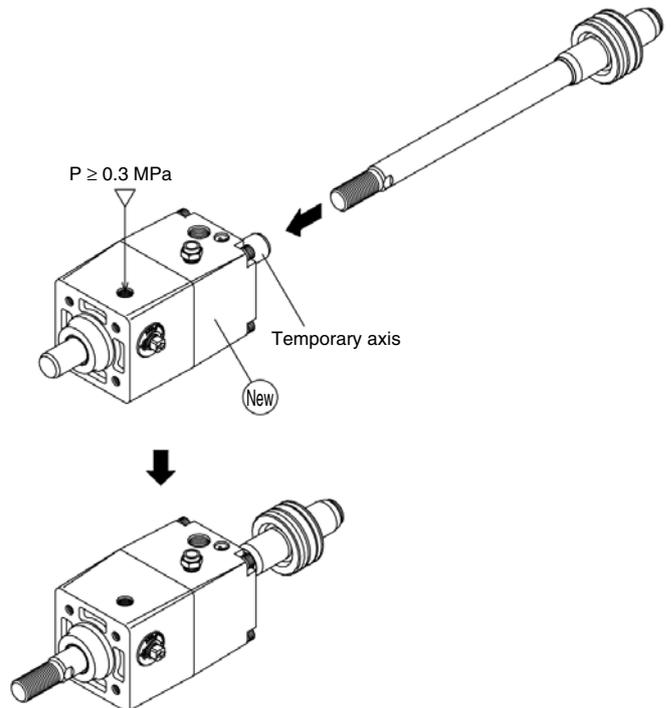
- Remove the tie-rods, head cover and cylinder tube.



- Apply 0.3 MPa or more of compressed air to the unlocking port, and pull out the piston rod assembly.



- Similarly, apply 0.3 MPa or more of compressed air to the unlocking port of the new lock unit, and replace the new lock unit's temporary axis with the previous piston rod assembly.



- Reassemble in reverse order from steps 2) and 1).

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□